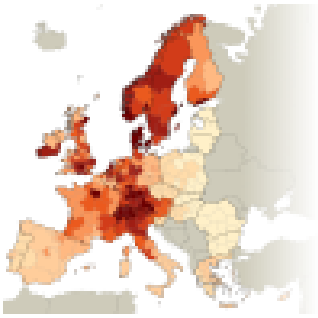
HyperAtlas User Manual



HyperCarte Research Gr

http://hypercarte.imag.fr

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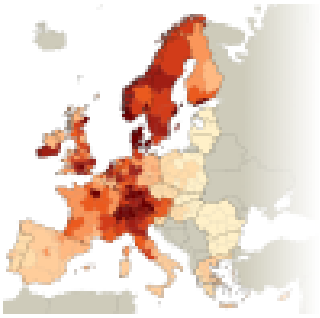
HyperAtlas User Manual:



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Abstract

This document proposes guidelines on how to use HyperAtlas.

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Preface

HyperCarte Research Group

HyperCarte Research Group aims at providing projects and applications for interactive cartography. The projects focus on the development of an easily understood methodology that allows the analysis and visualization of spatial phenomena, taking into account its multiple possible representations.

Statistical observations of the territory are complex, and one representation, directly linked to a precise objective, is the result of a combination of different choices which are relative on one hand to the territories and their geographical scales, to the the statistical indicators on the other hand. This is of interest for researchers as well as for development policy decision-makers.

Thus, the principal innovative aspect of the HyperCarte project lies on this perspective based on the popularization of methods coming from spatial analysis such as the fitting of territorial scales, gradients, discontinuities…. This supposes an effort of multidisciplinary cooperation between geographers and computer scientists in order to create new maps in real time according to the different choices. An important effort has concerned ergonomics and time of calculus.

Partners of the HyperCarte Research Group are the following teams:

UMS 2414 RIATE http://www.ums-riate.com

CNRS UMR 8504 Géographie-Cités [UMR 8504] http://www.parisgeo.cnrs.fr

LIG MESCAL [UMR 5217] http://mescal.imag.fr/

LIG STeamer [UMR 5217] http://steamer.imag.fr/

For further information, please visit HyperCarte Research Group Web site on http://hypercarte.imag.fr. For any question comment or suggestion, please contact the HyperCarte Research Group at `<hypercarte@imag.fr>`.

HyperAtlas User Manual

This document proposes guidelines on how to use HyperAtlas.

The figures are mainly screenshots of various historical HyperAtlas customized distributions for ESPON, EEA or PDLT projects, for example.

Chapter 1. An Introduction to HyperAtlas

HyperAtlas is a tool designed for **Multiscalar Territorial Analysis**: several indicators on the basis of the ratio of two initial geographical indexes can be derived, according to different spatial contexts.

Multiscalar Territorial Analysis is based on the assumption that it is not possible to evaluate the situation of a given territorial unit without taking into account its relative situation and localization. Regions belong to territorial and spatial systems. Indeed, from a policy point of view and in a social science perspective, contrasts and gradients are of much more interest than absolute values. Furthermore, aggregating and disaggregating territorial units allow to see how local values add up to form territorial contexts and regional positions.

Whatever the indexes used for political decisions, they have to be evaluated in relative terms. This may be done according to various territorial contexts. Thus one spatial organization may be examined from three different viewpoints that are three territorial contexts. They are differentiated according to the scale of political intervention or action they are referring to and that have a sense for the questioning: a global one, a medium one and finally a local one. Thus what is represented is the deviations to the three reference values associated to these different levels.

Let us take the example of the European union as a set of 25 countries, at the level of the region (NUTS2 for instance), and let the observed index be the wealth per resident in the regions (GDP/inh.). It is possible with HyperAtlas to consider the level of wealth of the regions relatively to three territorial contexts, and not only from an absolute point of view. The chosen contexts may be for instance respectively:

1. the whole European Union;
2. the country;
3. the neighborhood defined by contiguous regions.

HyperAtlas proposes for such an indicator a set of maps and charts that will be furthermore described in MTA parameters and HyperAtlas Tools:

- First maps show the selected study area, both the parent distributions as disc maps (here, wealth and population) and their ratios, that is to say the chosen index's one.
- Then, three maps show the relative deviations to the three chosen contexts as choropleth maps. For the above example: the deviation of a region to the European reference area, the deviation of a region to its national reference area, and in the third place the deviation of a region to the local reference area.
- Then, two synthesis maps allow to evaluate the different combinations of the three previous relative deviation maps.
- More advanced users are also provided a set of new tools like the maps of redistribution, the Lorenz curve and a chart of spatial autocorrelation.

Here are some political justifications about the contextual and multilevel mapping, based on the European example:

- The first map where the referent context is the global one is the classical way of mapping an index when the chosen context is the studied area. The values of the indices are converted into a global index.
- The second map, corresponding to the intermediate level, her the national one, is very important to combine with the previous one. Indeed, many contradictions can appear between the two levels, with important political consequences.

- The third one is based on the local differential between one region and the neighbouring ones according to various criteria of proximity (contiguity, time-distance). According to recent research in the field of spatial economy and regional science, those local advantages/handicaps appear to be of crucial importance for the regional cohesion because they are strongly connected with the action of economic or social actors.

- The multiscalar approach proposed to evaluate the same index at various scales. In terms of territorial cohesion, it is indeed very important to evaluate the level of development of a region according to at least three levels.

Chapter 2. A Typical MTA Session

As an introduction to the MTA concept, this chapter proposes an overview of a typical HyperAtlas v2 session, describing possible paths of investigation.

Users of the HyperAtlas v1 may remember the *typical* path of investigation, they were supposed to follow the seven following steps:

1. Choice of area, zoning and indicator of interest (that's to say a ratio)
2. Visualization of the ratio and (eventually) visualization of numerator and denominator without transformation
3. Analysis of inequalities at large level
4. Analysis of inequalities at medium level
5. Analysis of inequalities at local level
6. Synthesis of inequalities at large, medium and local level
7. Export of results towards a report

Of course, users are free to develop their own paths of investigation, and we can imagine different types of scenarios where users do not follow steps 1 to 7, but they adopt different strategies.

Let's now consider the following examples to demonstrate the benefits of a Multiscalar Territorial Analysis approach thanks to HyperAtlas:

- **Example 1**

  A stakeholder interested in the reform of structural funds after 2013 will probably use a path of investigation following the type **(1)=>(3)=>(7)** that will be repeated many times in order to test various scenario of allocation of funds. For example, what happens if:

  - NUTS2 is replaced by NUTS3?
  - GDP pps is replaced by GDP in Euro?
  - the threshold of 75% of EU mean is replaced by 80%?
  - Turkey joins EU?
  - etc.

- **Example 2**

  A local decision maker mainly interested in its region may use a path of investigation following the type **(1)=>(6)=>(Save map)**, if the objective is to quickly extract three figures describing the situation of the regions at European, National and Local levels for a given criteria. He/she can then decide to click on other regions in order to benchmark its situation with neighbouring areas, or to identify other regions with the same strength and weaknesses. He/she can also decide to modify the indicator and to explore the strength of weaknesses of his/her region for various criteria, GDP/inh, unemployment, accessibility, ageing, etc.

- **Example 3**

  A spatial economist interested in economic convergence may decide to examine the situation of regions according to vertical contexts (e.g. belonging of region to a state, an INTERREG area) and horizontal contexts (e.g. difference between a region and its neighbours for different thresholds of

contiguity or distance). He/she will therefore follow the expected steps **(1) to (7)**, but he/she will probably introduce loops in the steps **(4)** and **(5)** in order to explore different variants of vertical and horizontal context. The loop **(1)=>(5)** will for example provide answer on question like the GDP/ inh. Of course, the region of Budapest is greater than the neighbours for a distance of one hour by road, but what happens for a distance of two hours on a truck? Four hours? etc.

Having established that different users will not pay equal attention to the different functions offered by HyperAtlas, we can also suspect that expert users will expect more sophisticated functions than non-expert users, who will be on the contrary reluctant to enter into complex indicators or results.

Considering these different types of users, HyperAtlas v2 provides an **expert mode** (see HyperAtlas expert mode chapter), opened on request by the user (expert users or curious). In summary, the expert mode provides the following tools that complete the typical path of investigation:

- Equi-repartition maps, one per context, for Large, Medium and Small (local) levels
- Lorenz curve and statistical indexes (Gini index, Hoover index, coefficient of variation, ...)
- Boxplots
- Spatial autocorrelation chart

Chapter 3. HyperAtlas Startup

HyperAtlas software is available:

- as a standalone desktop application `jar` (Java Executable Archive) file. Most of the time, this executable is named `HyperAtlas.jar`. This executable is also called "*HyperAtlas Launcher*".
- as a Java Applet executable from a standard Web Browser (Mozilla Firefox, for example).

This section proposes information on how to prepare your environment for executing both versions.

3.1. HyperAtlas Standalone Application

To execute the HyperAtlas Standalone Application `HyperAtlas.jar` file, a Java Runtime Environment version 1.7 or higher must be correctly installed on your workstation.

To check your Java version, open a terminal (Windows users: DOS, Mac/Unix users: Terminal, for example) and type the command **java -version**. This command must return a message indicating your current version. In the following example, the version of Java is `1.7.0_51`:

```
java version "1.7.0_51"
Java(TM) SE Runtime Environment (build 1.7.0_51-b13)
Java HotSpot(TM) 64-Bit Server VM (build 24.51-b03, mixed mode)
```

For instructions on how to install or update your Java version, please consult Free Java Download [https://www.java.com/en/download/] (last visit: 2015-07-28).

Then, to execute the application:

- **Recommended for all users** (advised to get eventual error messages displayed to the output console):

  locate a terminal prompt in the directory where your `HyperAtlas.jar` file is available and type the following command:

  ```
  java -jar HyperAtlas.jar
  ```

- **Windows/Mac users**:

  from your Explorer/Finder, simply double-click the `HyperAtlas.jar` file. Please note that this method makes difficult to get eventual error messages...

Expected result:

1. A dialog box invites you to read and accept the terms and conditions of use.
2. A splashscreen logo displays the version of your custom HyperAtlas distribution while loading the software. Figure 3.1 shows the displayed logo for the HyperAtlas *Politique de la Terre* customized version.

Figure 3.1. PDLT HyperAtlas Splash Screen Logo

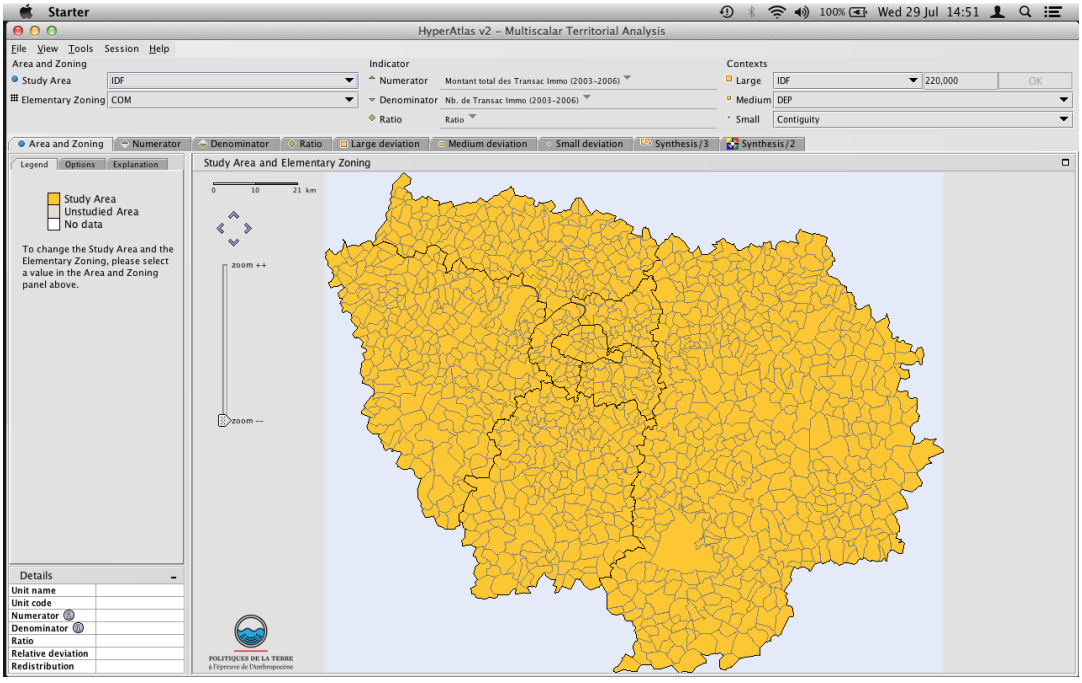
This figure shows one of the customized splashscreen logo displayed while HyperAtlas is loading. This logo is displayed when executing the HyperAtlas launcher designed for the *Politiques de la Terre à l'Usage de l'Anthropocène* project (July 2015) [5].

3. A window displays the terms and conditions of use that the user must read and accept to continue.

4. The default dataset hyp file embedded in the executable archive is loaded and displayed in the HyperAtlas Window.

Please note that depending on the customization of your `HyperAtlas.jar` distribution, logos, splashscreen, license and default hyp file are different. Figure 3.2 shows the expected window when starting up the custom HyperAtlas launcher designed for the *Politiques de la Terre à l'Usage de l'Anthropocène* project (July 2015) [5]. To compare various HyperAtlas custom versions, please also consult Figure 5.1.

Figure 3.2. PDLT HyperAtlas Startup Window



This screenshot shows the HyperAtlas startup window when executing the customized distribution of HyperAtlas for the project entitled *Politiques de la Terre à l'Usage de l'Anthropocène.*. A default dataset hyp file is loaded. The application starts with the first map tab entitled "*Study Area*", showing the default loaded dataset geo print and mesh.

3.2. HyperAtlas Applet

Based on the Java Applet technology, HyperAtlas Applet requires a standard Web browser and a correctly installed Java Runtime Environment (JRE) plugin for this Web browser. A version 1.7 or higher of the JRE is required (while writing these lines, the version 1.8 is advised).

For more information on how to setup a JRE plugin, please consult the following subsections or the following links (last visit: 2010-12-28):

- Verify Java version [http://www.java.com/en/download/installed.jsp]
- How do I enable java in my web browser? [http://www.java.com/en/download/help/enable_browser.xml]
- Mac OS X users: Java Frequently Asked Questions [http://developer.apple.com/java/faq/]

3.2.1. Check your Web Browser Java Plugin

This section proposes some information on how to enable the Java Plugin in your Web Browser.

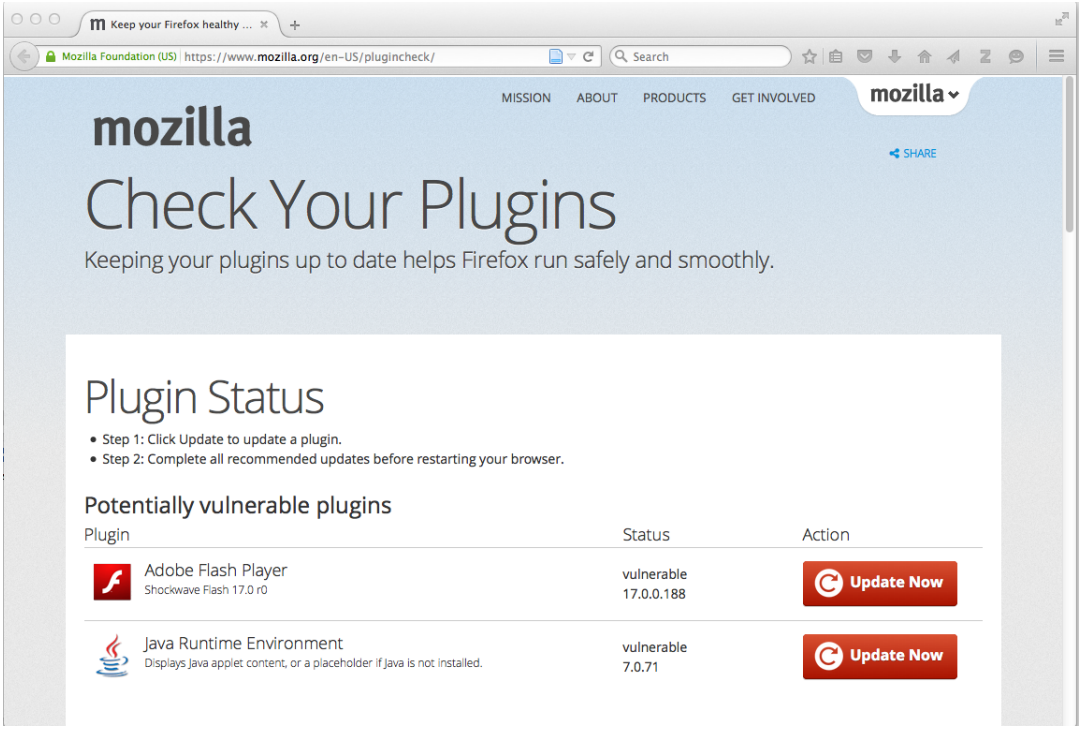
Depending on your combination of Operating System and Web Browser, please consult the following adhoc sub-section.

3.2.1.1. Mac OS X - Mozilla Firefox

This section proposes a description on how to check, update and enable the Java Plugin in the Mozilla Firefox Web Browser installed on a Mac OS 10.9.5 - Mavericks Operating System.

First of all, online check your Firefox Java Plugin at mozilla - Check your plugins [https://www.mozilla.org/en-US/plugincheck/] (2015-06-25), as shown in Figure 3.3. In this case, the current Java Plugin (JRE version 1.7, aka version 7) has to be updated.

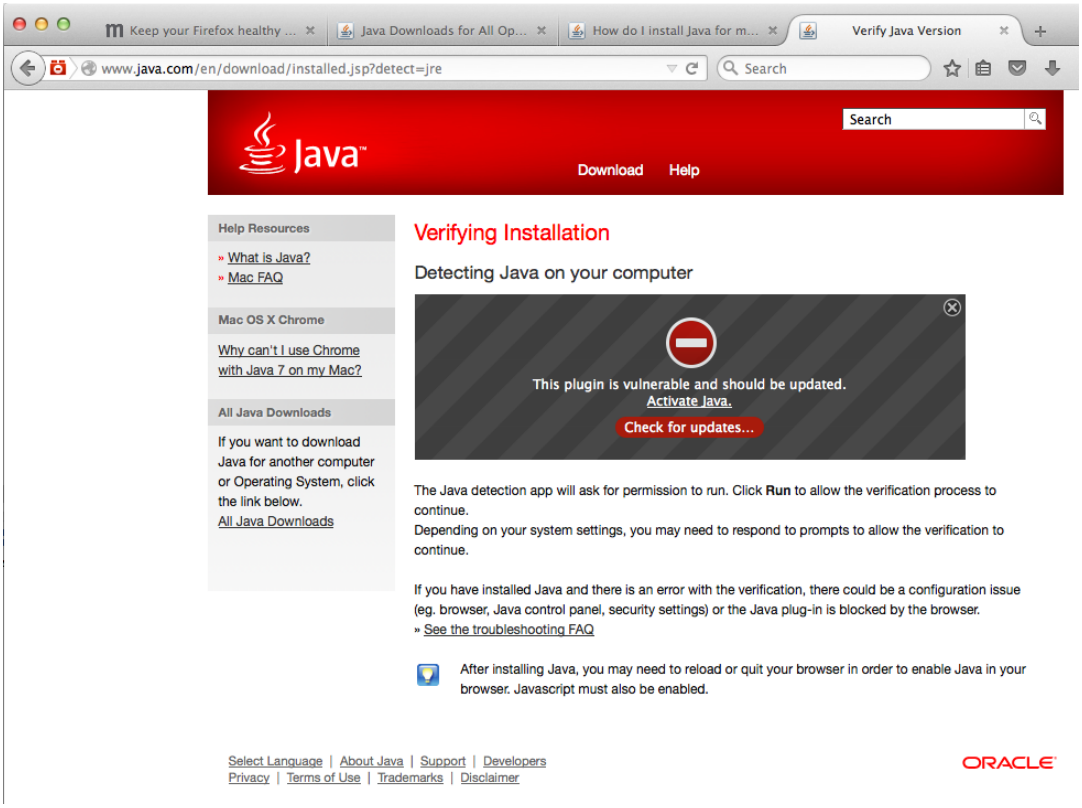
Figure 3.3. Mozilla Plugins



This screesnhot shows the Mozilla page indicating that the Java Plugin has to be updated.

Note that the online page Verify Java Version [http://www.java.com/en/download/installed.jsp] on the Oracle Web site (last visit: 2015-06-25) indicates the same *vulnerability* information, as shown in Figure 3.4.

Figure 3.4. Verify Java Version


Keep your Firefox healthy ...
Java Downloads for All Op...
How do I install Java for m...
Verify Java Version
www.java.com/en/download/installed.jsp?detect=jre
Search
Java
Download
Help
Search
Help Resources
What is Java?
Mac FAQ
Mac OS X Chrome
Why can't I use Chrome with Java 7 on my Mac?
All Java Downloads
If you want to download Java for another computer or Operating System, click the link below.
All Java Downloads
Verifying Installation
Detecting Java on your computer
This plugin is vulnerable and should be updated.
Activate Java.
Check for updates...
The Java detection app will ask for permission to run. Click Run to allow the verification process to continue.
Depending on your system settings, you may need to respond to prompts to allow the verification to continue.
If you have installed Java and there is an error with the verification, there could be a configuration issue (eg. browser, Java control panel, security settings) or the Java plug-in is blocked by the browser.
See the troubleshooting FAQ
After installing Java, you may need to reload or quit your browser in order to enable Java in your browser. Javascript must also be enabled.
Select Language | About Java | Support | Developers
Privacy | Terms of Use | Trademarks | Disclaimer
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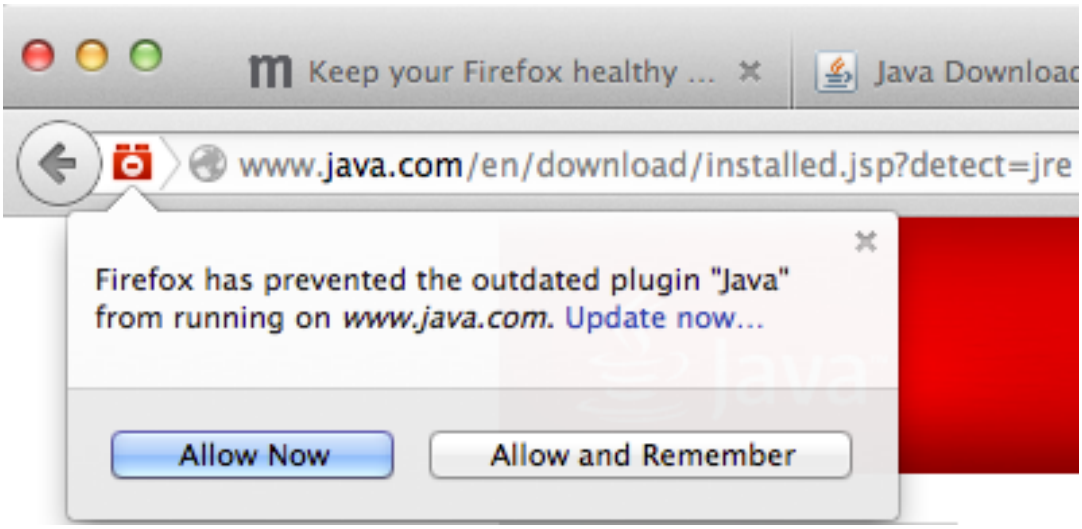
The Oracle Web site proposes a tool to verify the current installed Java Plugin version.

Note that when accessing this previous page, a Firefox popup warning window shown in Figure 3.5 also indicates the vulnerability issue.

Figure 3.5. Firefox: allow applet Warning

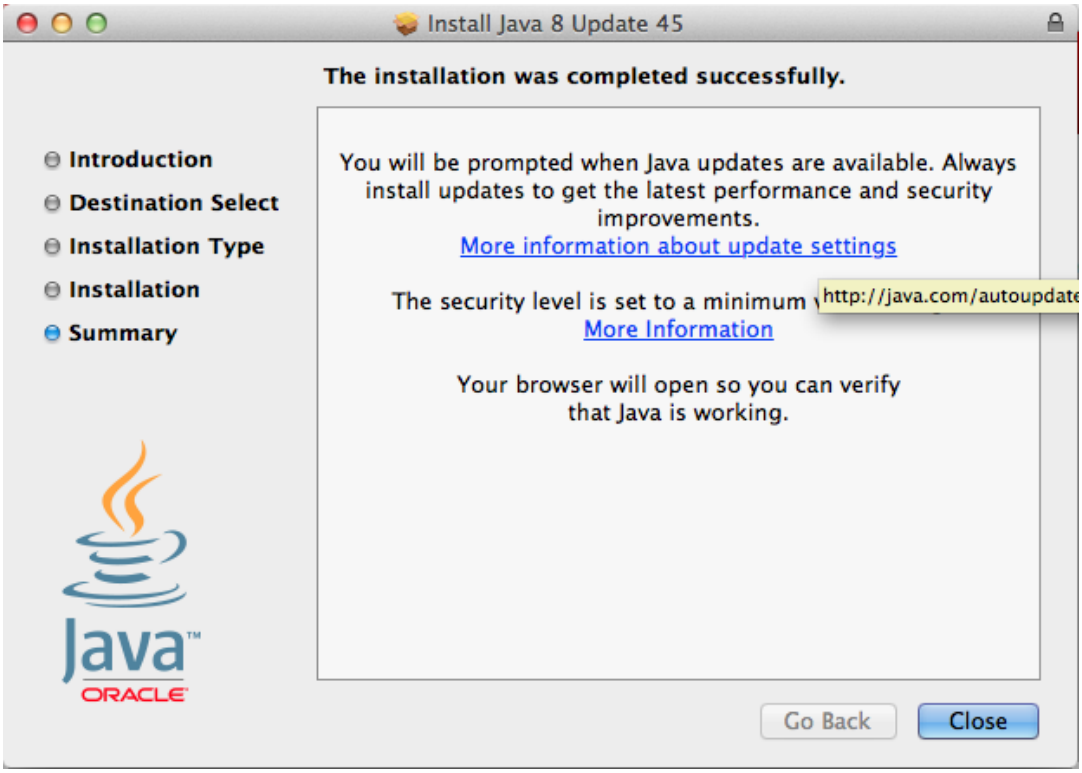

Keep your Firefox healthy ...
Java Downloac
www.java.com/en/download/installed.jsp?detect=jre
Firefox has prevented the outdated plugin "Java" from running on www.java.com. Update now...
Allow Now
Allow and Remember

So, it is time to update: consult the page entitled Java Downloads for All Operating Systems [http://www.java.com/en/download/manual.jsp] on the Oracle Web site. This previous page proposes various versions that depend on your operating system.

Download the version that fits your environment. For example, on Mac OS 10.9.5 - Mavericks, the target file to be downloaded is `jre-8u45-macosx-x64.dmg`.

Execute this `dmg` file, Figure 3.6 shows the last step of the install, for a successful update.

Figure 3.6. Java Successful Update Summary


Install Java 8 Update 45
The installation was completed successfully.
Introduction
Destination Select
Installation Type
Installation
Summary
You will be prompted when Java updates are available. Always install updates to get the latest performance and security improvements.
More information about update settings
The security level is set to a minimum
http://java.com/autoupdate
More Information
Your browser will open so you can verify that Java is working.
Java
ORACLE
Go Back
Close

This screenshot shows the Summary of a successful Java Update on Mac OS X.

- clicking the link label "*More information about update settings*" opens a Web browser tab at the following URL: http://java.com/en/download/help/mac_java_update.xml
- clicking the link label "*More information*" opens a Web browser tab at the following URL: http://java.com/en/security/

Then, restart Firefox, and re-consult the page Verify Java Version [http://www.java.com/en/download/installed.jsp].

Though Java has been updated, a message shown in Figure 3.7 asks to activate Java.

Figure 3.7. Activate Java

Verify Java Version
www.java.com/en/download/installed.jsp?detect=jre
Search
Java
Search
Download
Help
Help Resources
» What is Java?
» Mac FAQ
Mac OS X Chrome
Why can't I use Chrome with Java 7 on my Mac?
All Java Downloads
If you want to download Java for another computer or Operating System, click the link below.
All Java Downloads
Verifying Installation
Detecting Java on your computer
Activate Java.
The Java detection app will ask for permission to run. Click Run to allow the verification process to continue.
Depending on your system settings, you may need to respond to prompts to allow the verification to continue.
If you have installed Java and there is an error with the verification, there could be a configuration issue (eg. browser, Java control panel, security settings) or the Java plug-in is blocked by the browser.
» See the troubleshooting FAQ
After installing Java, you may need to reload or quit your browser in order to enable Java in your browser. Javascript must also be enabled.
Select Language | About Java | Support | Developers
Privacy | Terms of Use | Trademarks | Disclaimer
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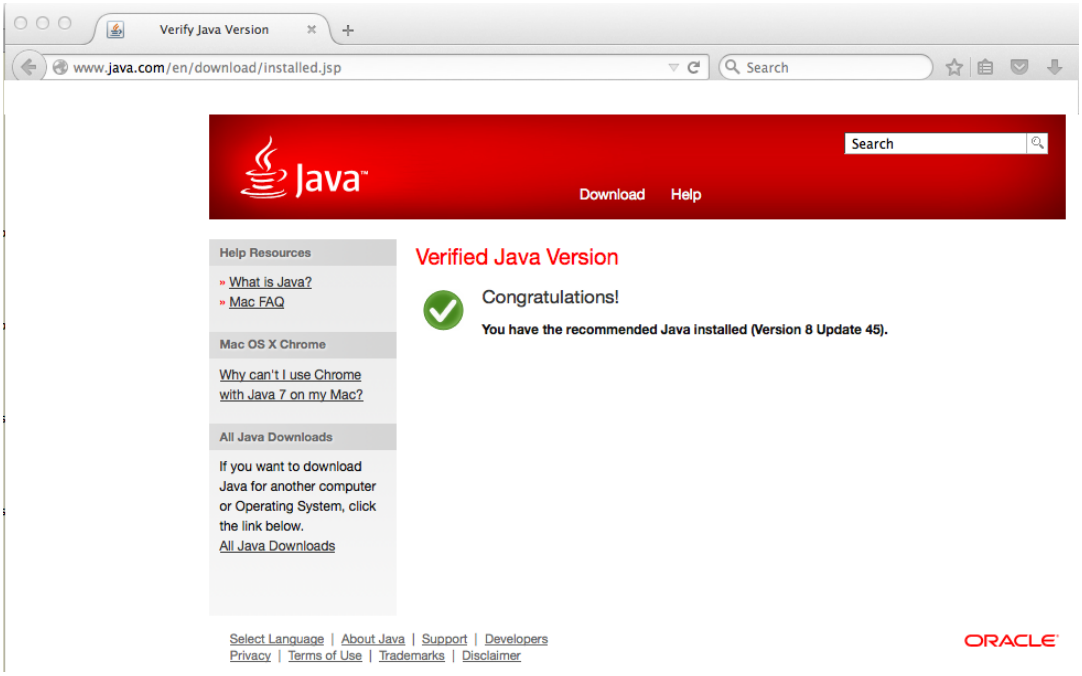
Enabling the Applet also requires to choose "*Allow now*" when the window shown in Figure 3.8 appears.

Figure 3.8. Allow Now

Do you want to run this application?
Name: Java Detection
Publisher: Oracle America, Inc.
Location: https://java.com
This application will run with unrestricted access which may put your computer and personal information at risk. Run this application only if you trust the location and publisher above.
Do not show this again for apps from the publisher and location above
More Information
Run
Cancel

Then, the Firefox Web Browser can now execute Java Applets as shown in Figure 3.9.

Figure 3.9. Java Up to Date


Verify Java Version
www.java.com/en/download/installed.jsp
Search
Java
Download
Help
Search
Help Resources
» What is Java?
» Mac FAQ
Mac OS X Chrome
Why can't I use Chrome with Java 7 on my Mac?
All Java Downloads
If you want to download Java for another computer or Operating System, click the link below.
All Java Downloads
Verified Java Version
Congratulations!
You have the recommended Java installed (Version 8 Update 45).
Select Language | About Java | Support | Developers
Privacy | Terms of Use | Trademarks | Disclaimer
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This screenshot shows the page Verify Java Version [http://www.java.com/en/download/installed.jsp] for a successful configuration of the Java Plugin. The installed version is now **Version 8 Update 45**

3.2.1.2. Linux Users

Instructions to enable the Java plugin in your Web Browser depend on your Linux distribution (Debian, Ubuntu, etc) and Web Browser (Mozilla Iceweasel, Firefox, etc). This is out of the scope of this document. Please consult: Manual Installation and Registration of Java Plugin for Linux [http://www.oracle.com/technetwork/java/javase/manual-plugin-install-linux-136395.html] on the Oracle Web Site (last visit: 2015-07-08).

3.2.1.3. Windows Users

First suggestion: migrate to Linux ;)

Second suggestion: please consult Verify Java Version [http://www.java.com/en/download/installed.jsp].

3.2.2. HyperAtlas Applet Execution

3.2.2.1. PDLT HyperAtlas 2015 Applet

Assuming that Java Applets can be executed in your Web Browser, another configuration step must be performed in order to allow the HyperAtlas PDLT Applet [./HyperAtlasApplet_demo.html] to be executed by your system. Indeed:

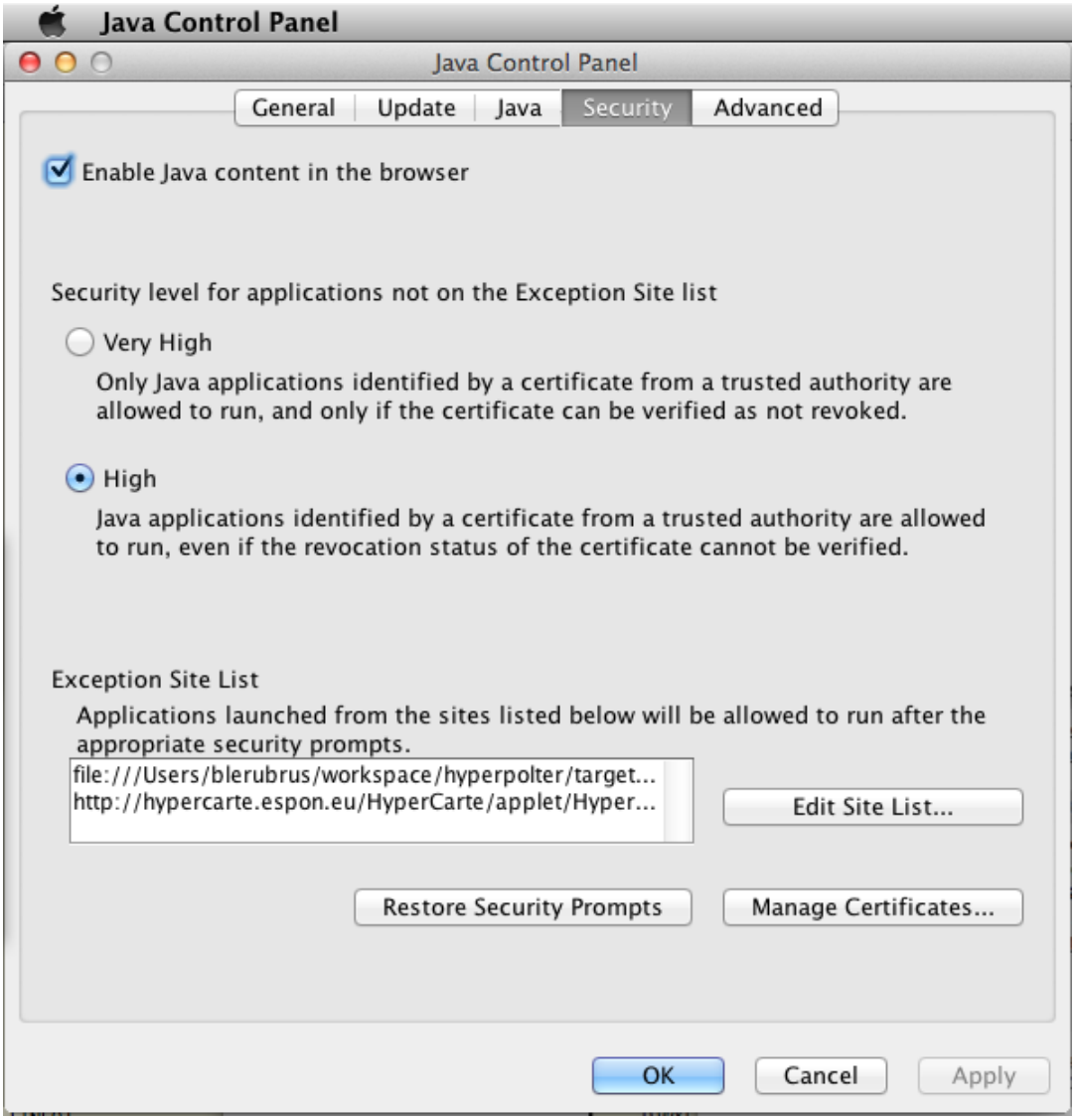
- some functionalities of the HyperAtlas software requires a write-access to your disk ("save map", "export report" functionalities, for example);
- the signature of the HyperAtlas Applet jar file with a valid CNRS Certificate has not been udpated since 2011 (see Section 3.2.2.2).

These points are potential security issues for an unknown distributor or untrusted software.

Nevertheless, for security reasons, you have to add an exception for executing the PDLT HyperAtlas Applet located at the following URL: http://hyperpolter.forge.imag.fr/HyperAtlasApplet.jar.

On a Mac workstation, from the "System Preferences" menu, click "Java Control Panel" (aka "Java") and consult the "Security" tab shown in Figure 3.10.

Figure 3.10. Java Control Panel Security Tab

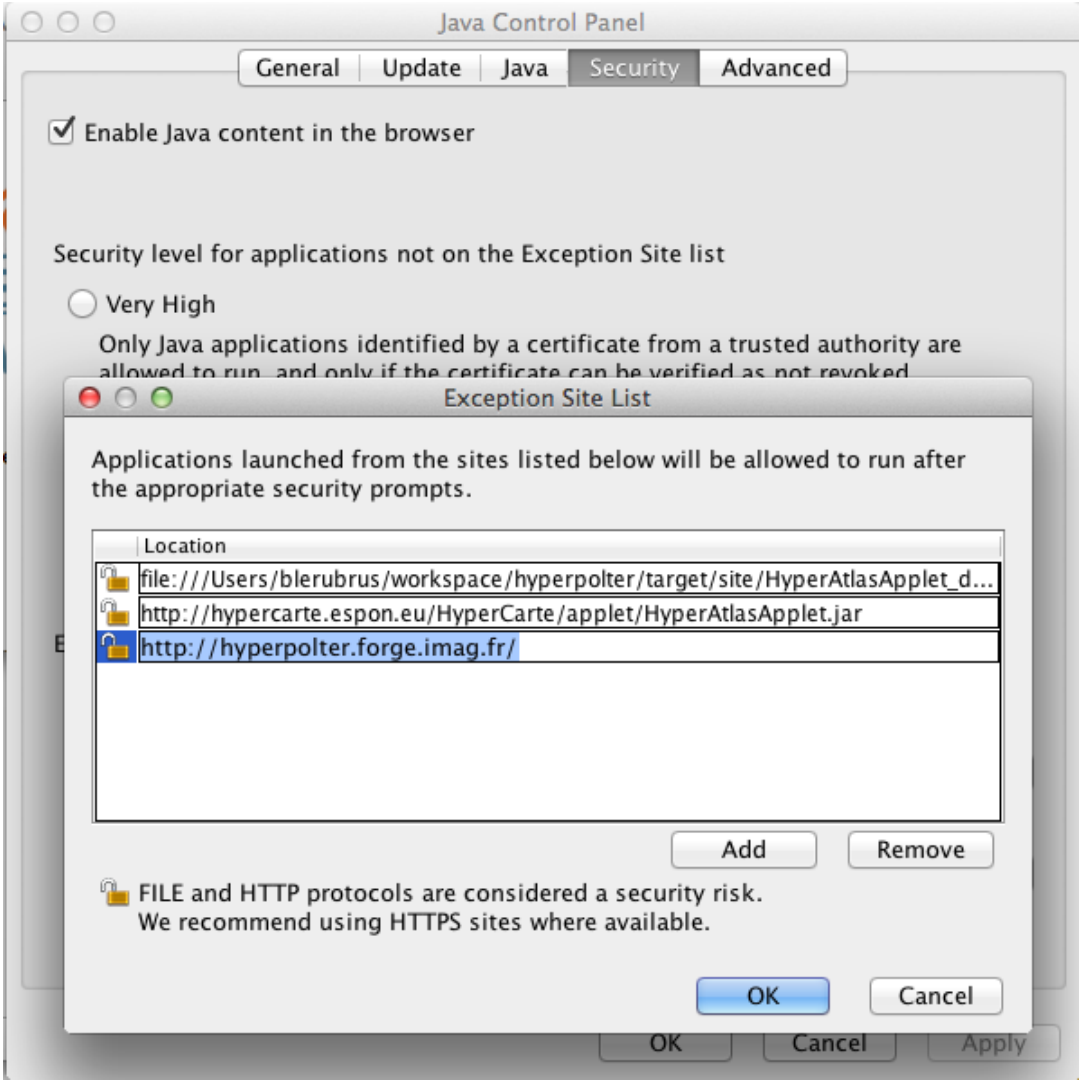

Java Control Panel
Java Control Panel
General
Update
Java
Security
Advanced
Enable Java content in the browser
Security level for applications not on the Exception Site list
Very High
Only Java applications identified by a certificate from a trusted authority are allowed to run, and only if the certificate can be verified as not revoked.
High
Java applications identified by a certificate from a trusted authority are allowed to run, even if the revocation status of the certificate cannot be verified.
Exception Site List
Applications launched from the sites listed below will be allowed to run after the appropriate security prompts.
file:///Users/blerubrus/workspace/hyperpolter/target...
http://hypercarte.espon.eu/HyperCarte/applet/Hyper...
Edit Site List...
Restore Security Prompts
Manage Certificates...
OK
Cancel
Apply

This screenshot shows the Java Control Panel program on a Mac OS X Operating System.

- Check the "*Enable Java in the Browser*" option.
- Click the "*Edit Site List*" button to add the URL of the Web site that hosts the HyperAtlas applet to the list of security exceptions.

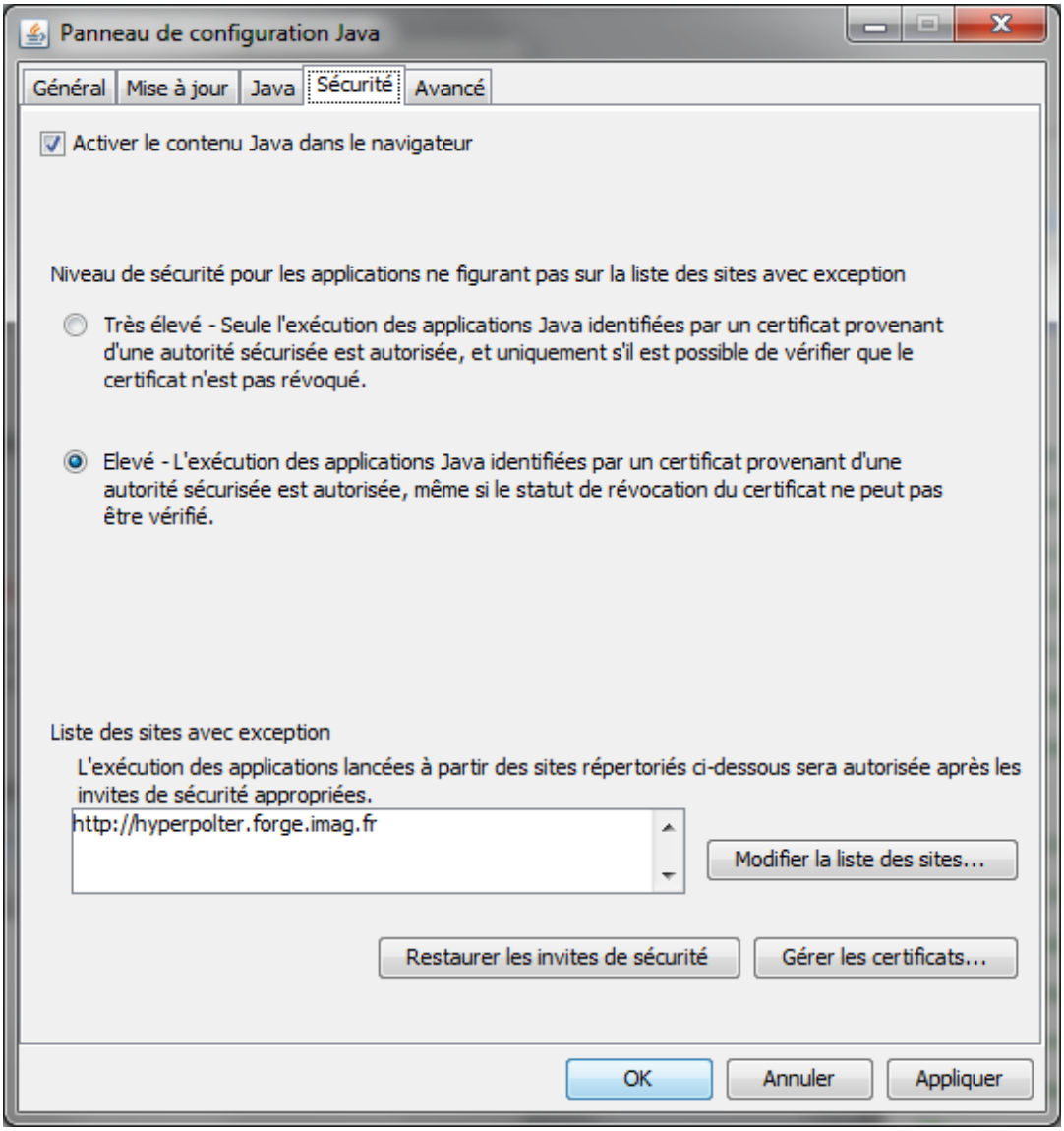
In this example, the HyperAtlas Applet is hosted at the following Web site URL: http://hyperpolter.forge.imag.fr. Consequently, add `http://hyperpolter.forge.imag.fr` to the list of security exceptions, as shown in Figure 3.11 (Mac) and Figure 3.12 (Windows).

Figure 3.11. Add Security Exception (Mac)



This screenshot shows how to add a security exception for the execution of an HyperAtlas applet hosted at the web site URL http://hyperpolter.forge.imag.fr.

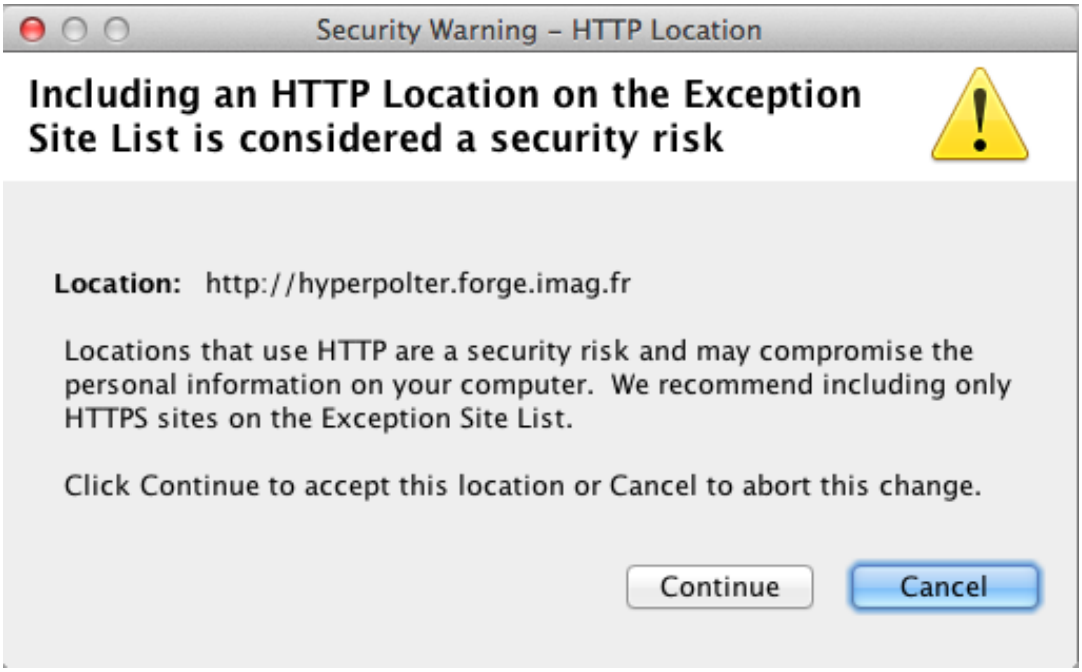
Figure 3.12. Add Security Exception (Windows)


Panneau de configuration Java
Général
Mise à jour
Java
Sécurité
Avancé
Activer le contenu Java dans le navigateur
Niveau de sécurité pour les applications ne figurant pas sur la liste des sites avec exception
Très élevé - Seule l'exécution des applications Java identifiées par un certificat provenant d'une autorité sécurisée est autorisée, et uniquement s'il est possible de vérifier que le certificat n'est pas révoqué.
Elevé - L'exécution des applications Java identifiées par un certificat provenant d'une autorité sécurisée est autorisée, même si le statut de révocation du certificat ne peut pas être vérifié.
Liste des sites avec exception
L'exécution des applications lancées à partir des sites répertoriés ci-dessous sera autorisée après les invites de sécurité appropriées.
http://hyperpolter.forge.imag.fr
Modifier la liste des sites...
Restaurer les invites de sécurité
Gérer les certificats...
OK
Annuler
Appliquer

This screenshot shows how to add a security exception on Windows for the execution of an HyperAtlas applet hosted at the web site URL http://hyperpolter.forge.imag.fr.

When validating the previous window, confirm when you are asked, as shown in Figure 3.13.

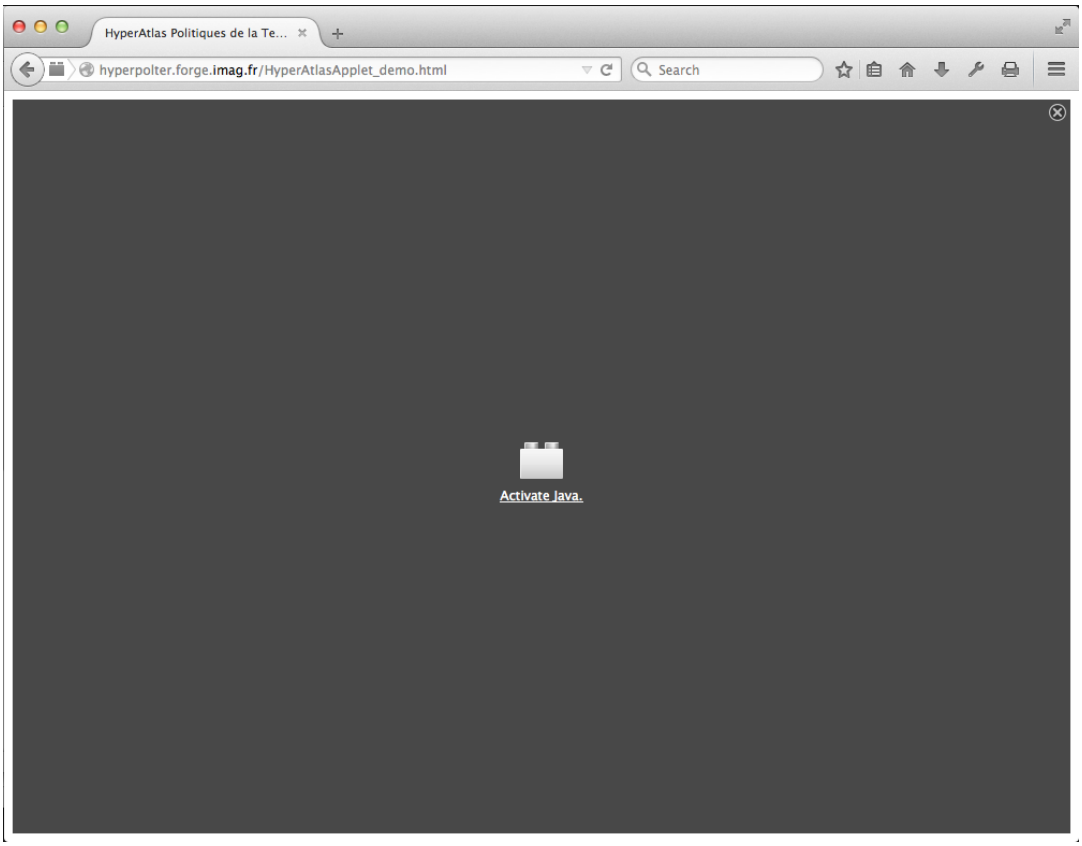
Figure 3.13. Confirm Security Exception


Security Warning – HTTP Location
Including an HTTP Location on the Exception Site List is considered a security risk
Location: http://hyperpolter.forge.imag.fr
Locations that use HTTP are a security risk and may compromise the personal information on your computer. We recommend including only HTTPS sites on the Exception Site List.
Click Continue to accept this location or Cancel to abort this change.
Continue
Cancel

Confirm the exception.

Restart your Web browser to take into account the security exception. Browse to the HyperAtlas PDLT Applet [http://hyperpolter.forge.imag.fr/HyperAtlasApplet_demo.html] Web page, which first shows a grey page asking to activate Java (Figure 3.14).

Figure 3.14. Activate Java



Then you are informed of the security issue, check the **I accept the risk** option and click the "Run" button (Figure 3.15).

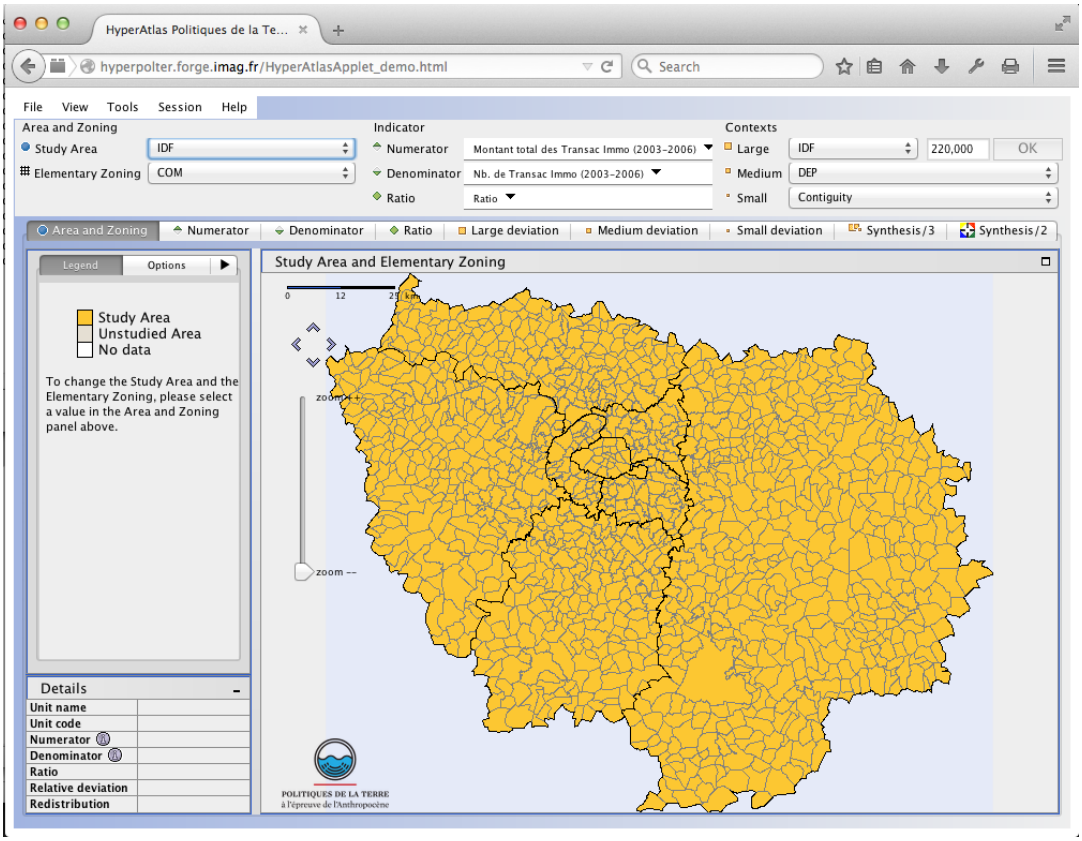
Figure 3.15. Accept The Risk and Run

Security Warning
Do you want to run this application?
Name: hypercarte.hyperatlas.HyperCarte
Publisher: UNKNOWN
Location: http://hyperpolter.forge.imag.fr
Running this application may be a security risk
Risk: This application will run with unrestricted access which may put your computer and personal information at risk. The information provided is unreliable or unknown so it is recommended not to run this application unless you are familiar with its source
More Information
Select the box below, then click Run to start the application
I accept the risk and want to run this application.
Run
Cancel

This screenshot shows the last warning before executing an HyperAtlas Applet. The option "I understand the risk" must be checked, then click "Run".

That's it! Figure 3.16 shows the expected page from where you can start your online Multiscalar Territorial Analysis with PDLT online HyperAtlas Applet.

Figure 3.16. PDLT HyperAtlas Applet Startup



This screenshot shows the startup of an MTA with PDLT online HyperAtals Applet.

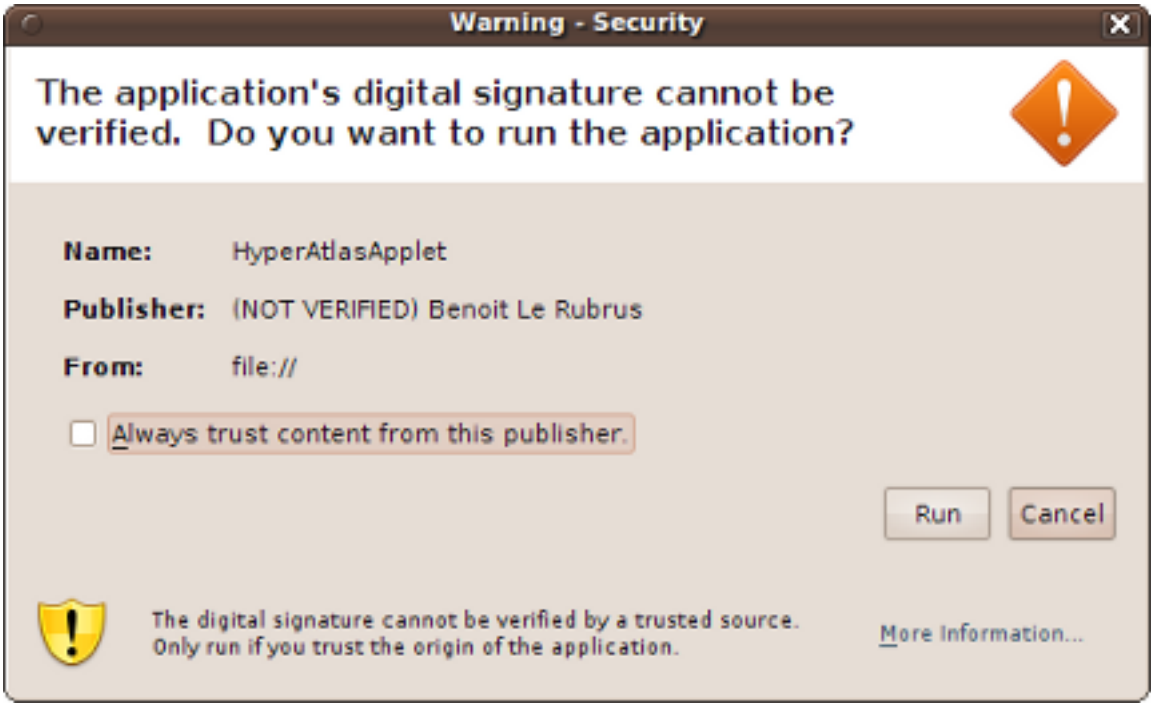
3.2.2.2. ESPON HyperAtlas 2011 Applet

Before starting the HyperAtlas Applet version, the user is warned that the HyperAtlas Applet is about to be run without the security restrictions that are normally provided by Java.

Indeed, HyperAtlas is allowed to read-write on the user's disk, to write an html report for example. To overcome the default behavior of Java Applets that are not allowed to write on the user's disk, the HyperAtlas applet has been signed with a CNRS-2 standard certificate (CNRS is an acronym for *Centre National de la Recherche Scientifique*).

Thus, the security warning window (Figure 3.17) which is opened before the startup of the application is expected. The user can insure about the content he is about to execute by opening the details of the certificate, as shown on figures Figure 3.18 and Figure 3.19.

Figure 3.17. Security Warning


Warning - Security
The application's digital signature cannot be verified. Do you want to run the application?
Name: HyperAtlasApplet
Publisher: (NOT VERIFIED) Benoit Le Rubrus
From: file://
Always trust content from this publisher.
Run
Cancel
The digital signature cannot be verified by a trusted source.
Only run if you trust the origin of the application.
More Information...

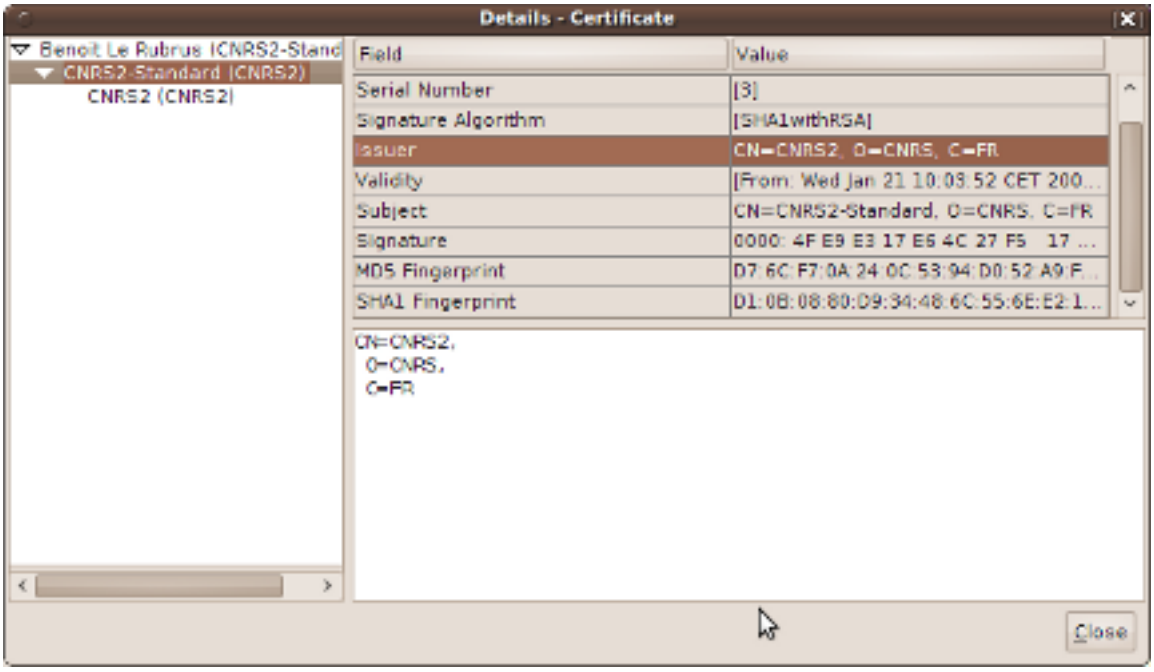
JVM Applet execution security warning displayed window before startup.

Figure 3.18. Security Warning: More Information

Warning - Security
More Information
This application will be run without the security restrictions normally provided by Java.
The digital signature was generated with an untrusted certificate.
Certificate Details...
Close
Run
Cancel
The digital signature cannot be verified by a trusted source.
Only run if you trust the origin of the application.
More Information...

The user has clicked the `More information...` link on the bottom of the window Figure 3.17

Figure 3.19. Security Warning: Certificate Details



The user has clicked the `Certificate details...` link on the bottom of the window Figure 3.19

Once the user has clicked the Run button on the security warning popup window, the HyperAtlas applet begins to load a dataset. Depending on the speed of this loading, a splash screen icon may appear a few seconds:

Chapter 4. HyperAtlas Dataset .hyp File

The datasets provided by geographers are serialized in a convenient format for HyperAtlas to a binary file named with the `.hyp` extension (example: `Europe_2007.hyp`). As a convention, these HyperAtlas dataset input files will be now called **hyp files**.

For further information on how to create HyperAtlas dataset `hyp` files, please consult the HyperAdmin [http://hypercarte.imag.fr/hyperadmin.html] section of the HyperCarte Research Group Web Site [3].

HyperAtlas is designed so it can load a dataset serialized as an `hyp` file. Once the user has accepted the terms and conditions of use displayed in a dialog box, the HyperAtlas loads an embedded default dataset.

The user can also load a dataset hyp file from his disk via the "File-Open" menu item of the application.

Please also find a library of various dataset hyp files in the section entitled Hypothèque [http://hypercarte.imag.fr/hypotheque.html] of the HyperCarte Research Group Web Site [3].

Chapter 5. HyperAtlas Menu

HyperAtlas is interactive. It works with three sets of parameters that are linked to one or more maps. At any time, the user can change the different input parameters, and the linked maps are immediately updated. The user may also individually configure each map, for instance:

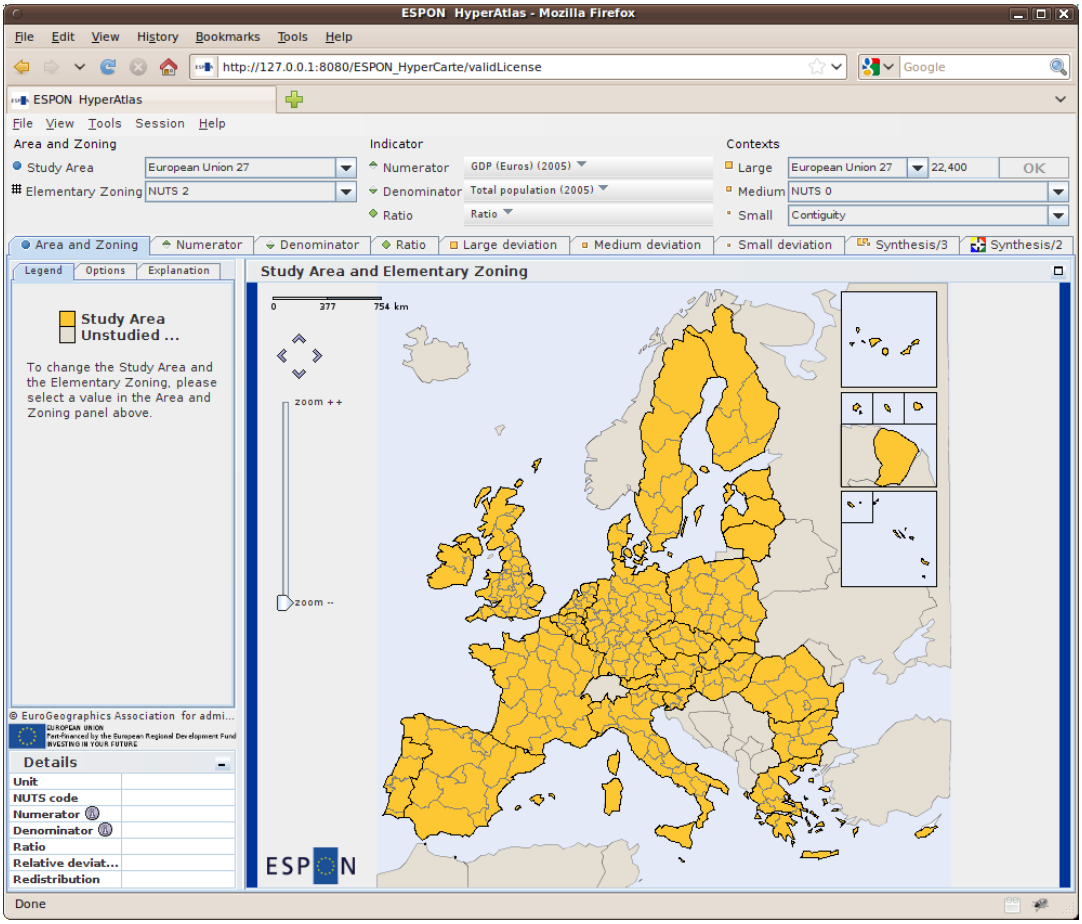
- the number of equivalence classes
- statistical progression (arithmetic or geometric)
- the pallet of colors
- etc.

This set of features allow to generate a very accurate collection of maps.

As shown on Figure 5.1, HyperAtlas Applet fills the full width of the browser window. A "*Back to dataset*" link at the top of the page allows the user to be redirected to the HyperCarte Web Application "Dataset" page. The main components of the HyperAtlas frame are:

- a menu bar
- the parameters panel threefold boxes:
  - **Area and Zoning** to select the geometric parameters of the analysis;
  - **Indicator** to select stocks or pre-defined ratios;
  - **Contexts for the deviations** to select the references of computed deviations.
- a main panel composed of the generated maps

Figure 5.1. HyperAtlas Window Overview

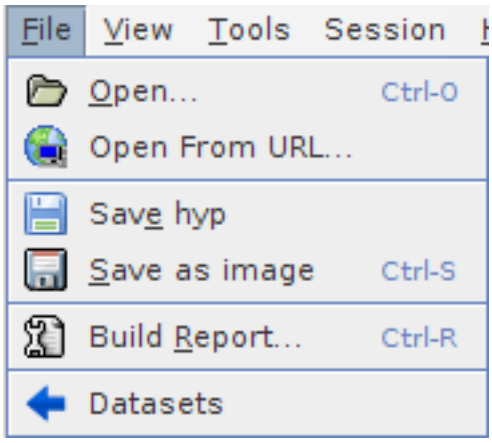


HyperAtlas Applet at startup.

Following sections first detail each item in the menu bar of the application.

5.1. File menu

Figure 5.2. Screenshot of the File menu



This menu allows:

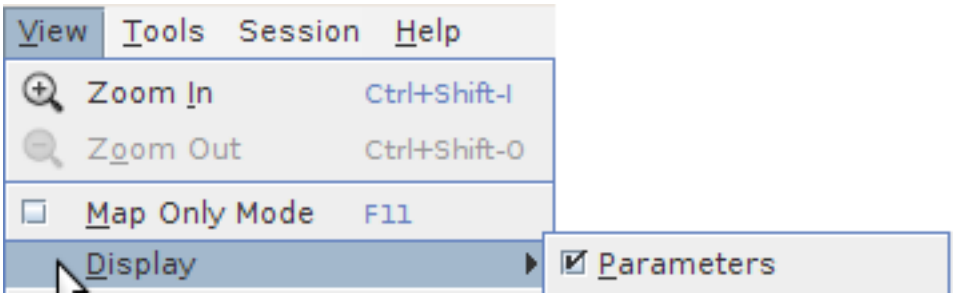
- to open a new dataset hyp file from your disk or from an eventual known URL (Unified Resource Locator) to an hyp file located at a server on the Internet;

- to save the current dataset to your disk as an `hyp` file;
- to save the current displayed tab as an image (PNG) file to your disk;
- to generate a report in HTML format, including an image each current tab of the current analysis.
- *(When embedded in a Web Application only)* to be redirected to the Web Application Dataset page in order to load another on-line dataset.

.

5.2. View menu

Figure 5.3. Screenshot of the View menu

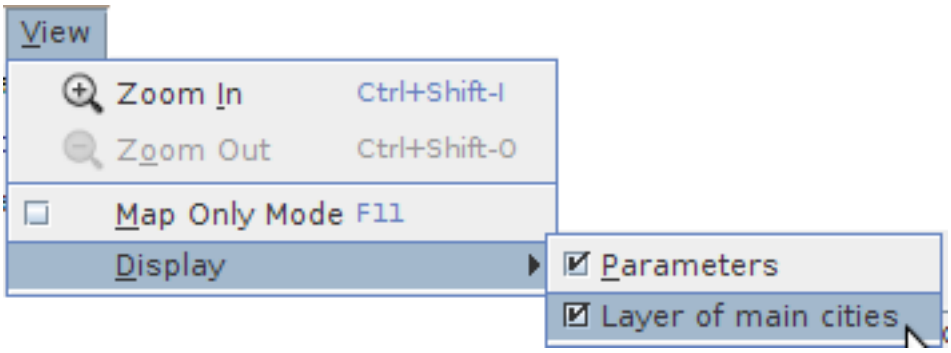


This menu concerns the appearance of the maps. It provides menu items to zoom in, zoom out and to choose the different panels that can be displayed as different parts of the window:

- the "Map only mode - F11" allows to display the map frameset as wide and high as possible;
- the "Display - Parameters" menu item makes the parameters panel visible or note.

Depending on the current loaded dataset, the "Display" submenu may also include an additional check-box item as shown on the Figure 5.4. This checkbox allows the user to display or hide the main cities over the map. By default, if the dataset provides such a layer, it is checked.

Figure 5.4. Display submenu options: cities layer



On this screenshot, the loaded dataset embeds the main cities. The "Display" menu allows to hide or display this additional layer.

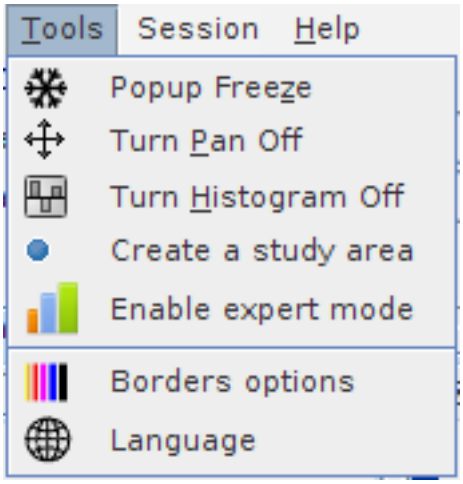
When the *Display-Cities* menu item is enabled, cities are displayed over the maps as black squares, as shown on Figure 5.5. Note that for ergonomy reasons, to avoid overlapping between cities labels, the names of the cities are not displayed over the map. Nevertheless, a tooltip appears when the mouse comes over a square.

Figure 5.5. Displayed cities

Cities are represented as black squares. The name of the city appears when the mouse moves over a square.

5.3. Tools menu

Figure 5.6. Screenshot of the Tools menu



The **Popup Freeze** menu item has been available since HyperAtlas v2. This functionnalitiy is usefull to compare several maps or charts: clicking on this menu item, a popup window is opened, displaying a frozen image of the current visisted tab.

Two options allow to manage the behavious of the mouse cursor:

- The **Turn Pan** menu item allows to enable the moves of the maps inside the window.
- The **Turn Histogram** menu item is only enabled for the synthesis map, it displays for each region the three contextual deviations (see synthesis as an histogram [34] paragraph)

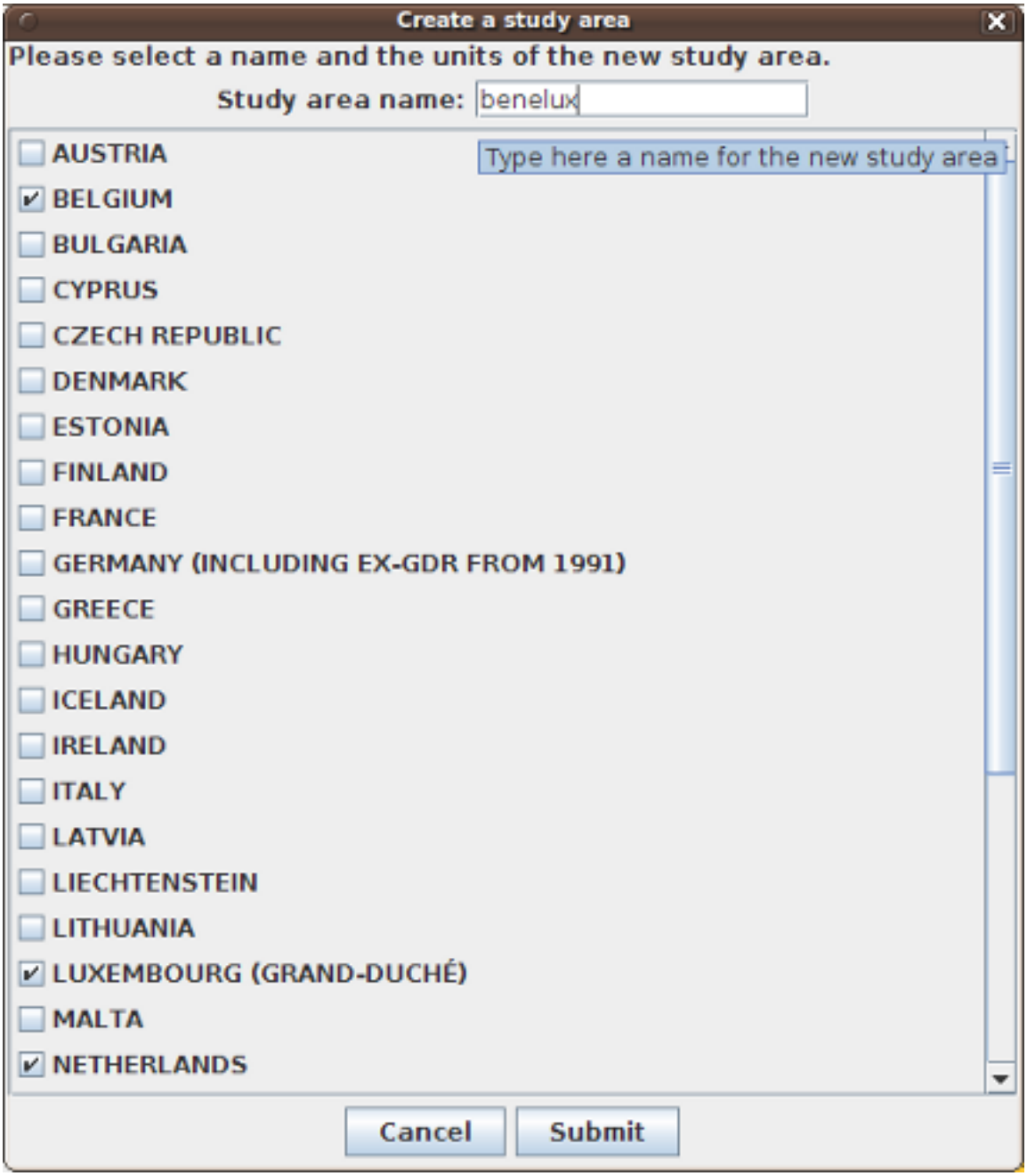
Other tools available on this menu:

- **Create a study area** menu item is described below.
- **Enable expert mode**" menu item is described in HyperAtlas expert mode chapter of this document.
- **Borders options**: use this item to choose the colors of borders of territorial units for example.
- **Language**: this menu item opens a dialog box that provides the list of available languages for the interface of the frame. The internationalization feature is currently available in english, french and romanian. The default language at startup depends on the locale of your system, english by default.

This version 2 of HyperAtlas allows to define a new study area. On clicking this menu item, the user is invited to enter a name for his/her new study area and to select the top-levels units (as a rule, countries) that will compose this study area.

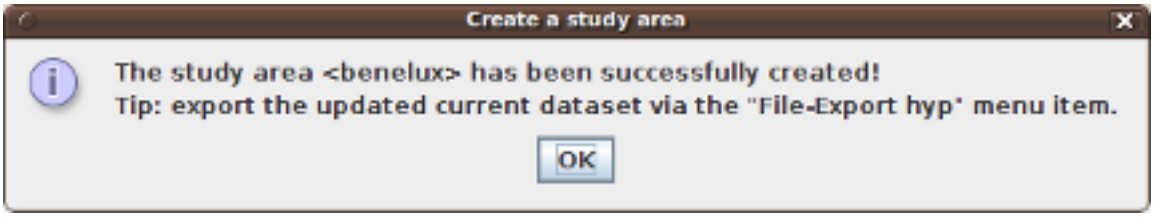
Figure 5.7 shows the example of a user who wants to define the `benelux` study area. He/she selects `Belgium`, `Luxembourg` and `Nederlands` units then clicks the "Submit" button. Figure 5.8 shows the information message that is displayed when the creation is successfull. The `benelux` parameter is now available from the Study Area combo box of the parameters panel. Figure 5.9 shows that interactive maps have been consequently updated on selecting this new study area.

Figure 5.7. Study area creation window



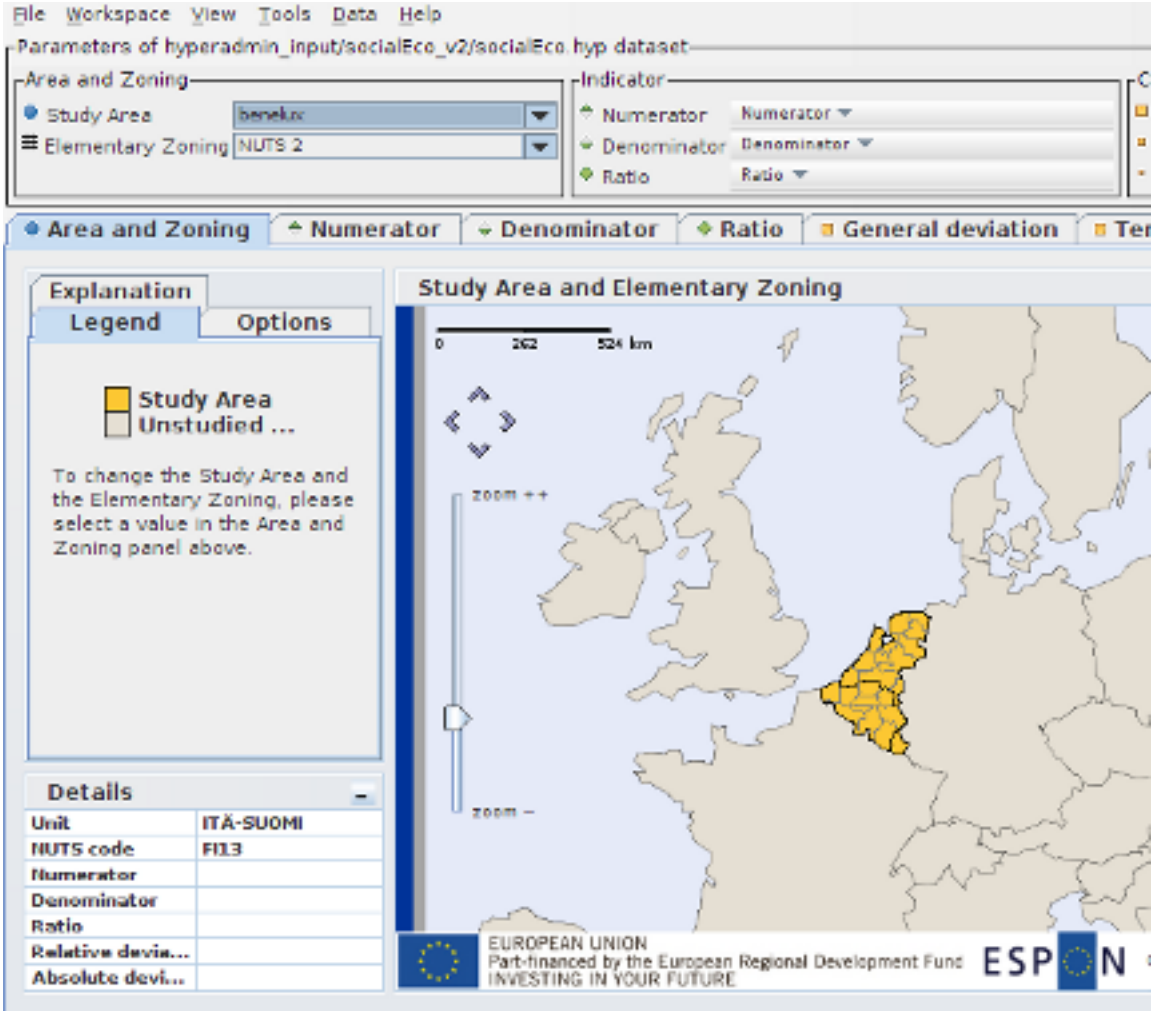
Provides the list of countries and a text field to enter a name for this new study area.

Figure 5.8. Study area creation success


Create a study area
The study area <benelux> has been successfully created!
Tip: export the updated current dataset via the "File-Export hyp" menu item.
OK

Infomation message.

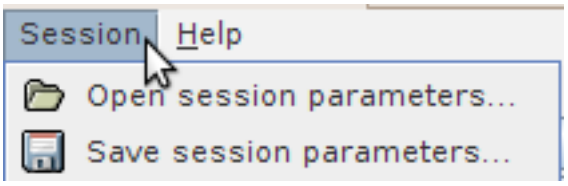
Figure 5.9. Map of the new study area



Selected new study area.

5.4. Session menu

Figure 5.10. Screenshot of the Session menu



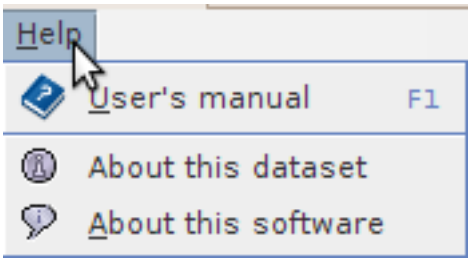
This menu allows to save the parameters of the current analysis to an HyperAtlas XML file on your disk.

In the case when you already saved such a file, this menu allows to load your previous session parameters.

A session parameters file is specific to a dataset. An error occurres if you try to load a session parameters file that was built while using another dataset.

5.5. Help menu

Figure 5.11. Screenshot of the Help menu



This menu provides the following items:

- **Help (F1)**: opens a new browser window to the on-line user's manual at the HyperCarte Research Group Web site [3].
- **About dataset** opens a popup window displaying metadata of the current dataset (author, creation date, version).
- **About** displays the current version of the software. Please note this version when reporting an eventual bug to the HyperCarte Research Group, as described in When things go wrong.

Chapter 6. MTA parameters

This section focuses on how to set the HyperAtlas parameters for a Multiscalar Territorial Analysis (MTA [54]). As its title suggests it, the next section (An example of multiscalar typologies of regions) first describes the main concept of such an analysis. Please read it in order to efficiently benefit of the provided tools by HyperAtlas v2.

Some screenshots of this chapter were performed with a previous version of HyperAtlas. Though the graphical user interface has been updated since this version, the concepts remain the same.

6.1. An example of multiscalar typologies of regions

Taking account the European level as an example, this section focuses on the importance of considering the multiscalar typologies of regions in political decisions.

When the policymakers want to build political scenari or when they want to evaluate propositions of structural funds, they need to get a synthetic view on the situations of regions which depend on the various territorial contexts.

The question of perequation (transfer from “advanced” to “lagging” region) is very sensible and it is important to propose a complete view of the scales where those perequation processes can take place, according to the principle of subsidiary.

As an example, we analyse how the picture of “lagging” regions is modified when the previous criterion of Objective 1 (less than 75% of the mean value of GDP) is applied simultaneously at three scales: European, national and local.

Simultaneously, it is possible to propose a typology of “advanced regions” based on the symmetric criteria of more than 133% of the mean value of GDP at those three scales.

According to this methodology, it is possible to demonstrate that very few regions are “lagging at all scales” and “advanced at all scales”. Many are in more complex situations, like certain regions of Switzerland or Norway which are “advanced” at European scale, but they are “lagging” at their national or local scales.

Reversely, the metropolitan regions of candidate countries are very often “lagging at European scale” but “advanced at national and local scales”.

6.2. Setting the Study Area

The setting of the study area should be the first step of any analysis. Setting the basis of the study can be done by answering the following questions:

- which spatial extension (area) and for which geographical level?
- which division will be the elementary zoning?

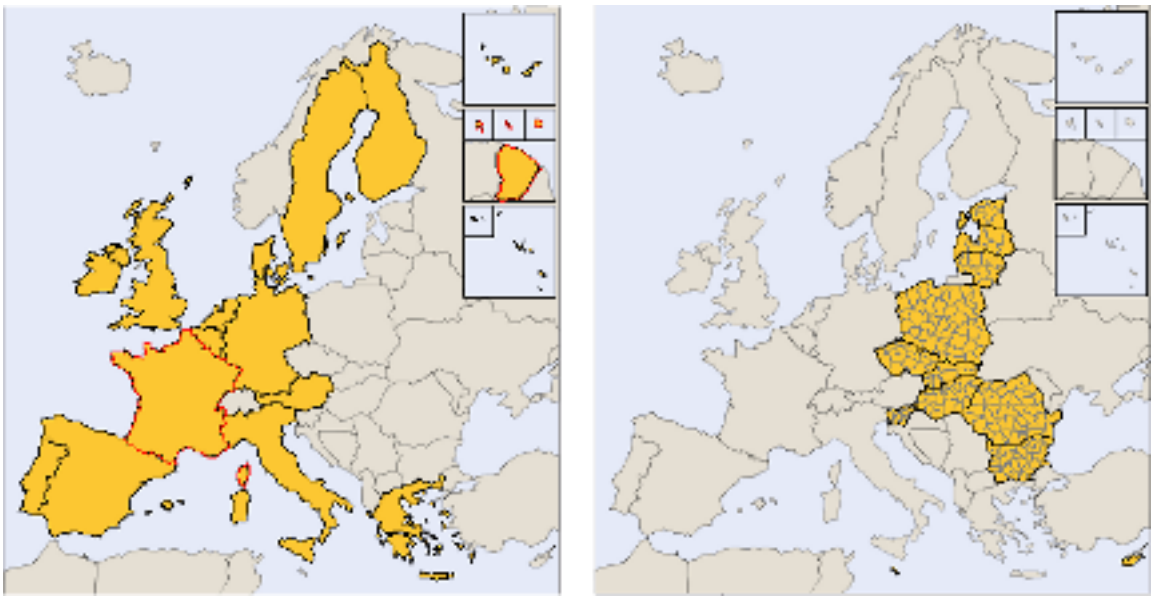
As shown on Figure 6.1, these two parameters have to be selected in the two respective pop up lists. The different propositions are internal and come from the a priori implementation.

Figure 6.1. Study area fields

- **Study Area** shows the spatial extension that will be mapped.
- **Elementary zoning** shows the set of elementary units that will be studied.

Figure 6.2 illustrates two possible combinations. The selected area is mapped when the chosen elementary zoning is drawn.

Figure 6.2. Combination of study area and elementary zoning



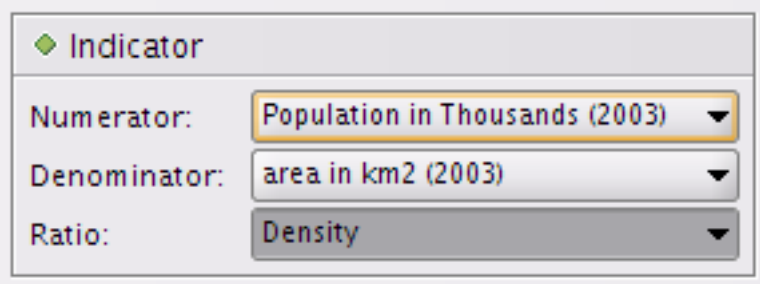
These two maps were extracted from the "Area and Zoning" tab of the application with following settings:

	Study Area	**Elementary Zoning**
Map on the left	European Union 15	NUTS 0
Map on the right	New member states 12	NUTS 3

6.3. Setting the indicators

HyperAtlas only works with size variables (that is to say that only variables that may be aggregated at upper level by sum), and proposes a multiscalar cartography of the ratio for two size variables in order to set the studied ratio. The user can combine every couple of these types of variables in the “Indicators” box, by choosing each of them in the associated select boxes as shown on Figure 6.3.

Figure 6.3. Indicators box



This box provides three select boxes to choose indicators. The user selected the `Density` item in the **Ratio** select box:

- **Numerator** is set to `Population in 2003`
- **Denominator** is set to `Area in km`^{2}
- **Ratio**: depending on the chosen dataset (the hyp file), selecting a ratio may implie the auto-selection of the numerator and denominator fields values.

Three maps are respectively linked to these choices, under three different tabs (see Figure 6.4). The maps for the numerator and for the denominator (size variables) are represented with proportional circles. The ratio map is shown with colored units, according to the ratio value. The number of classes and their associated colors (the *pallet* tool) can be can be set in the "Option" tab of the ratio map.

Figure 6.4. Numerator, denominator and ratio tabs

The three associated tabs to the chosen indicators are represented here for the study area `EU 15` (15 countries in Europe) with the `NUTS 0` value (countries) for the elemetary zoning:

- the image on the left shows the **Numerator** map within its associated tab, here, the `population in 2003`
- the image in the center shows the **Denominator** map within its associated tab, here, the `area in km`^{2}
- the image on the right shows the **Ratio** map within its associated tab, here, the density.

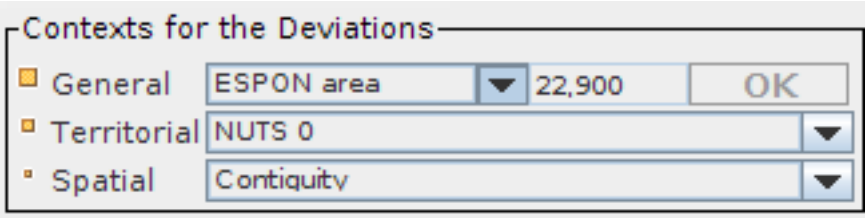
6.4. Setting the contexts for deviations

As described in various contexts [1] paragraph, the user has to define the three territorial contexts which respectively set three different levels of spatial observation: global, medium and local. Figure 6.5 shows the select boxes to set these parameters.

The names of the references have been updated since the previous versions of HyperAtlas:

- *Global* has been renamed **General**;
- *Medium* has been renamed **Territorial**;
- *Local* has been renamed **Spatial**.

Figure 6.5. Contexts box



The "Contexts" box allows to set three references for their associated deviations: general, territorial and spatial contexts.

The **general context** may be the whole chosen study area. In such a case, the associated map will be the same as the associated map to the ratio itself. So, the user may choose another general context or a reference value. For instance, in the example of the EU, even if the study area is the 29 potential countries, it may be of interest to observe the spatial differentiations according to another global reference, for instance the global value associated to EU15. For this level, the user may also exogenously enter a value. By default, this value has first been set to the value of the global area.

The **territorial context**, on the other hand, has to be a geographical zoning that is an aggregation of the “elementary zoning” that was previously chosen.

The **spatial context** shows which proximity relation will be the basis of the neighborhood’s definition for each elementary unit. That is usually “contiguity”, but it may also be a relationship based on distances since they have been introduced in the hyp file (units that are less than X kilometers far from), or time-distances. Then, each elementary unit value will be compared to the value of its neighborhood.

A set of three maps are linked to these choices (Figure 6.6). The values of the deviations are transformed into global indexes 100. Thus, values may be interpreted in terms of percentage to the reference value. The maps are drawn with double progression frame centered on 100, in order to highlight the regions that are under the reference value (100), and the ones that have upper values.

Figure 6.6. Deviations maps tabs

These screenshots show the three deviations maps tabs for chosen contexts: general deviation on the left, territorial deviation in the center and spatial deviation on the right.

6.5. The synthesis maps

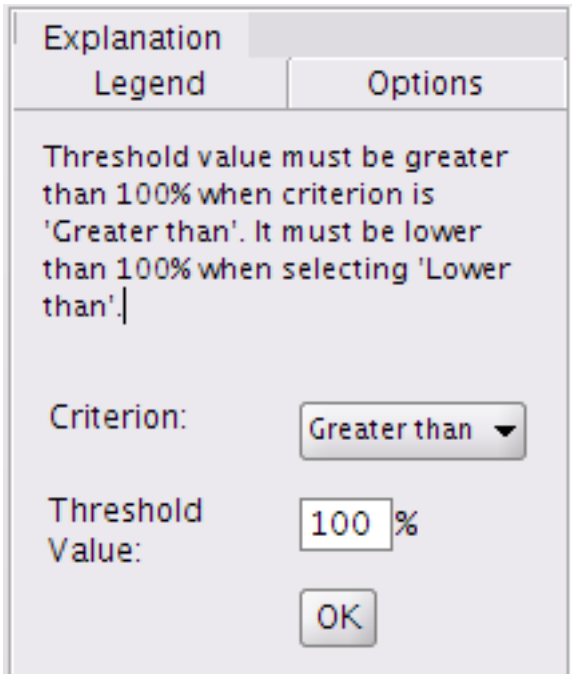
One synthesis map was already available in the previous version of HyperAtlas, based on three levels and one treshold, it is described in Ternary synthesis map. A new synthesis map has been added to the application since the version 2.0: see Dual synthesis map.

6.5.1. Ternary synthesis map

The three relative positions about contexts are summarized in one synthetic map. The elementary units are classified in eight classes according to their three relative positions.

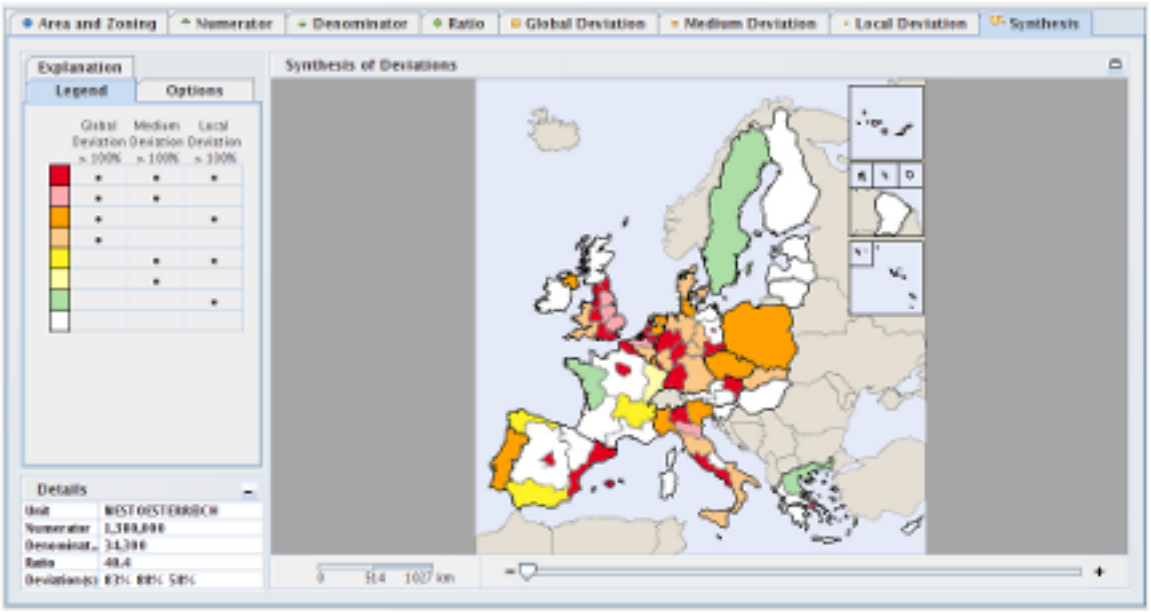
In order to reduce the whole combinatory of possible cases, from the "Options" tab close to the synthesis map (Figure 6.7), the user must specify which point of view he wants to focus on: the first "Criterion" parameter shows whether the point of view is to underline the regions whose ratio is **greater than**, or to underline the contextual values, by selecting **less than**. This choice depends on the studied indicator (see An example of multiscalar typologies of regions section). For instance high values of unemployment rates point out different types of regions than high values of an indicator of resources. According to which regions have to be differentiated (lagging ones or wining ones), the user must chosse the point of view of the synthesis. Then, the user can choose the threshold percentage.

Figure 6.7. Synthesis map options



The map on Figure 6.8 illustrates the eight different configurations of relative position, according to the three previously chosen contexts and parameters. The legend tab gives for each class the descriptions of the contextual positions. The last class (in white) gather the regions that are not concerned by the chosen comparative criterion whatever the contexts are.

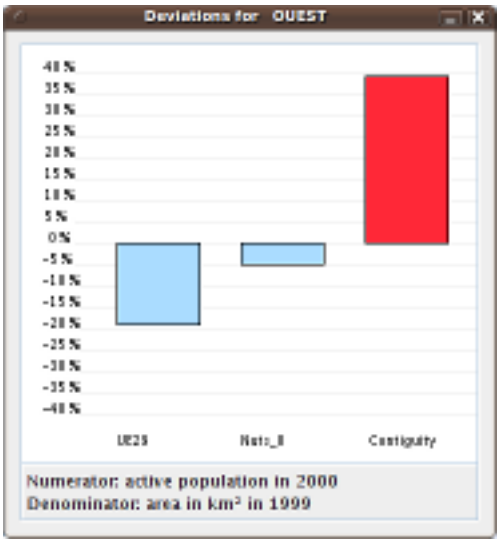
Figure 6.8. Synthesis map tab



This screenshot shows the synthesis map tab for the contexts that were chosen in the previous example shown on Figure 6.6.

When “Histogram” is enabled (see Section 5.3 section), the user may represent the three contextual deviations of a selected (clicked) region as an histogram as shown on Figure 6.9.

Figure 6.9. A deviations synthesis histogram for a regiion



This screenshot shows the synthesis histogram of the clicked region named `OUEST` (West of France). The general deviation of this region is relative to the `UE29` general context. The territorial deviation is relative to the `NUTS 0` hierarchical context, the spatial deviation considers the contiguity, e.g. the neighborhood of this region.

6.5.2. Dual synthesis map

The dual synthesis map is a new cartographic tool that has been introduced in the version 2.0 of HyperAtlas. It aims at showing via a chromatic legend the status of territorial units on taking into ac-

count two chosen deviations. This section describes the synthetis opportunity that is offered to analysts thanks to this tool.

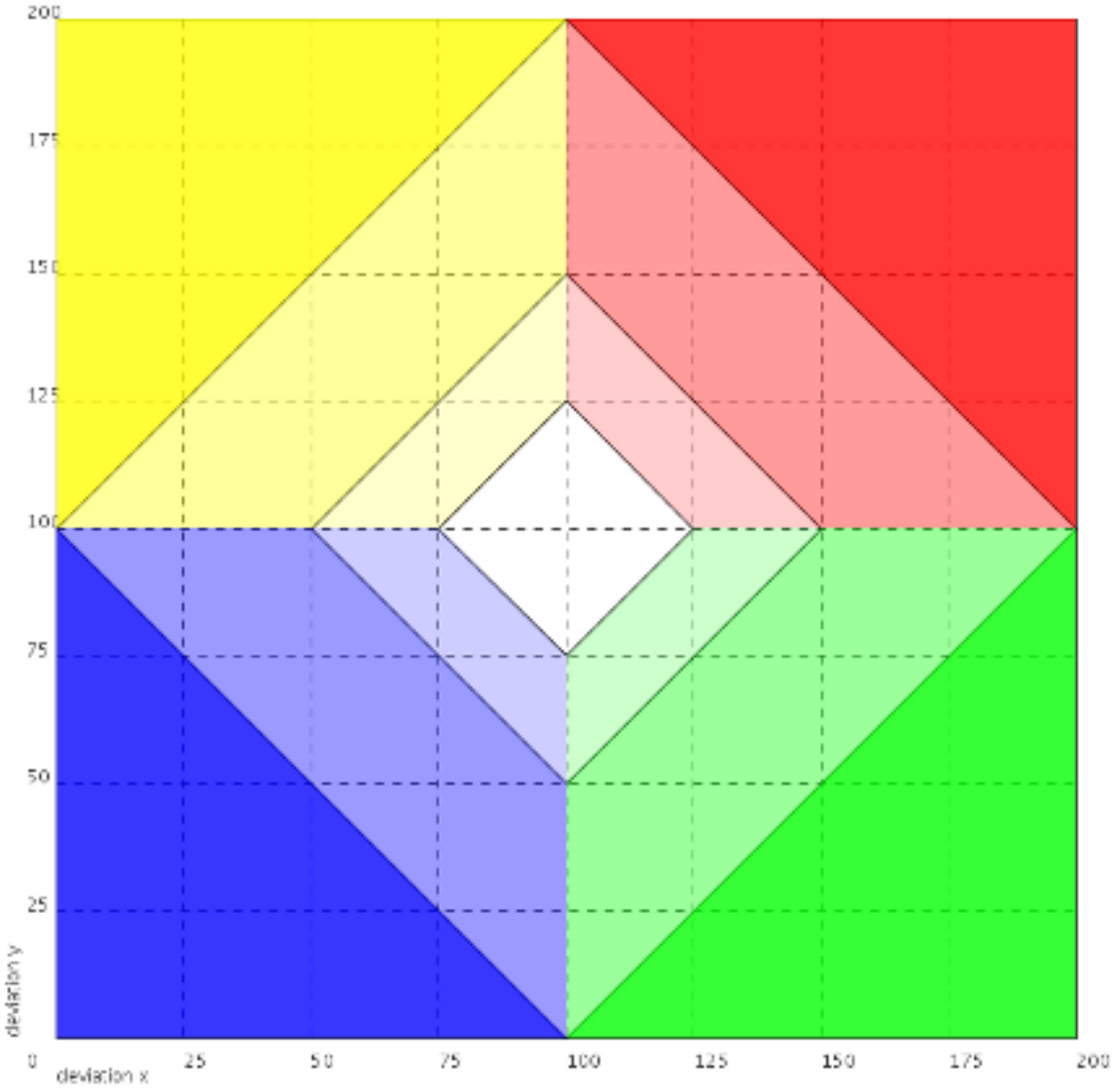
The legend of the dual synthesis map shown on Figure 6.10 is composed of four main quarters. The values on both axis range range from 0 to 200% and they represent the percentages of a deviation of a territorial unit relatively to a context of reference. The user is invited to select in an options tab the contexts of deviations to be considered for both axis (among the general, the territorial or the spatial context).

Let's consider the following example: the general deviation has been chosen for the horizontal axis and the spatial deviation for the vertical axis. The four main colors of the legend represent the following cases:

- **yellow**: the global deviation (X axis) is lower than 100% (the average pivot value) and the spatial deviation (Y axis) is upper 100%
- **red**: both deviations are upper 100%
- **blue**: both deviations are lower than 100%
- **green**: the global deviation (X axis) is upper than 100% and the spatial deviation is lower than 100%

Note that the more far from the value 100 the current deviation is, the more intense the color is. Hence a white square in the middle of the legend: this range of values show the territorial units whose both deviations are around the average, 100.

Figure 6.10. Legend of the dual synthesis map

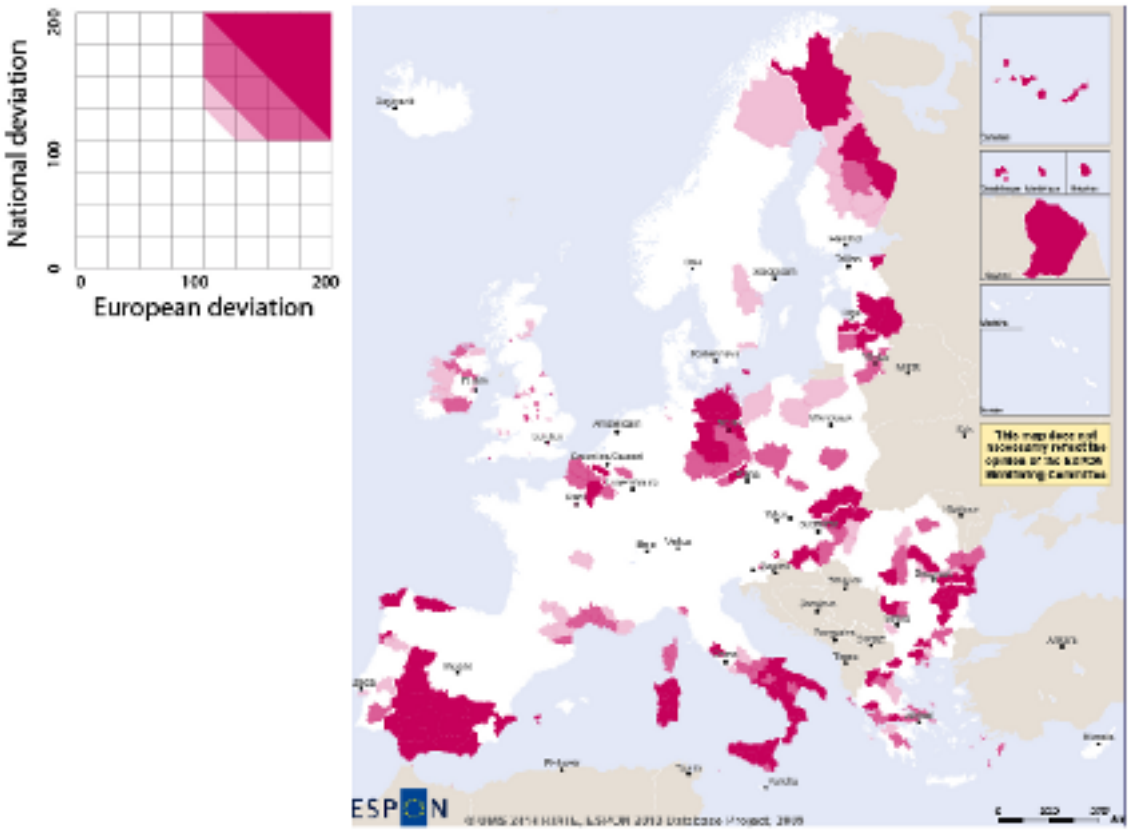


Graduations and quarters of the dual deviation synthesis map legend.

Let's consider now a concrete example on how the dual deviation map can help analysts: the following screenshots decompose as four steps the synthesis about the situation in 2010 according to the European and National averages of unemployement:

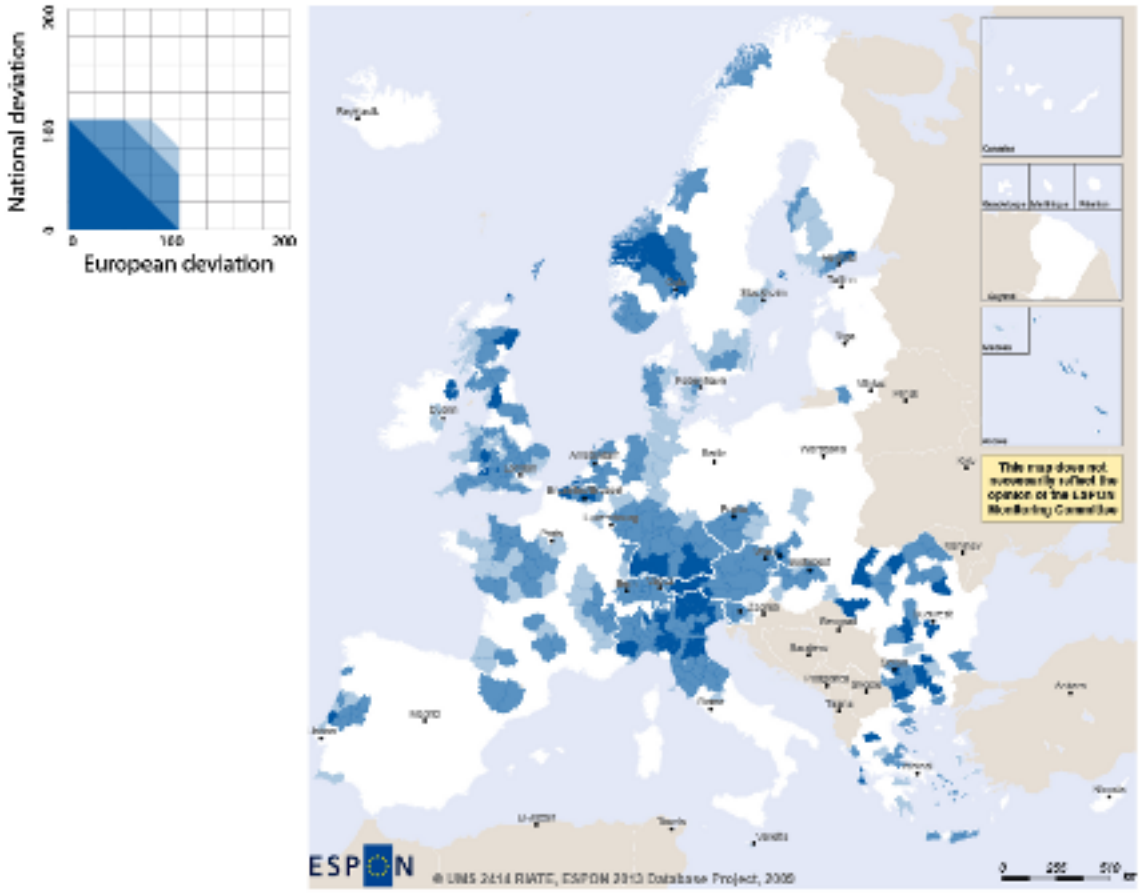
- Figure 6.11 shows in red the territorial units whose unemployement rate is above average both at European and National levels:

Figure 6.11. Dual synthesis map: red units



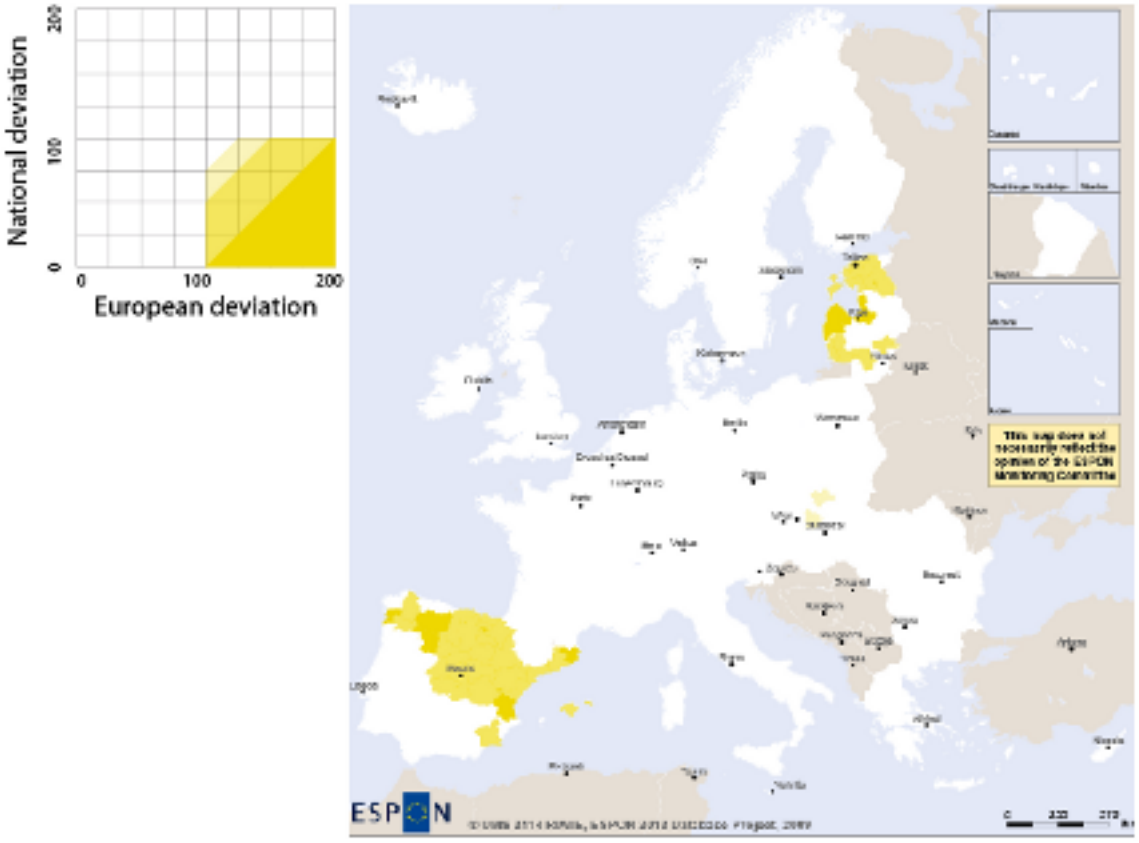
- Figure 6.12 shows in blue the territorial units whose unemployement rate is under average both at European and National levels:

Figure 6.12. Dual synthesis map: blue units



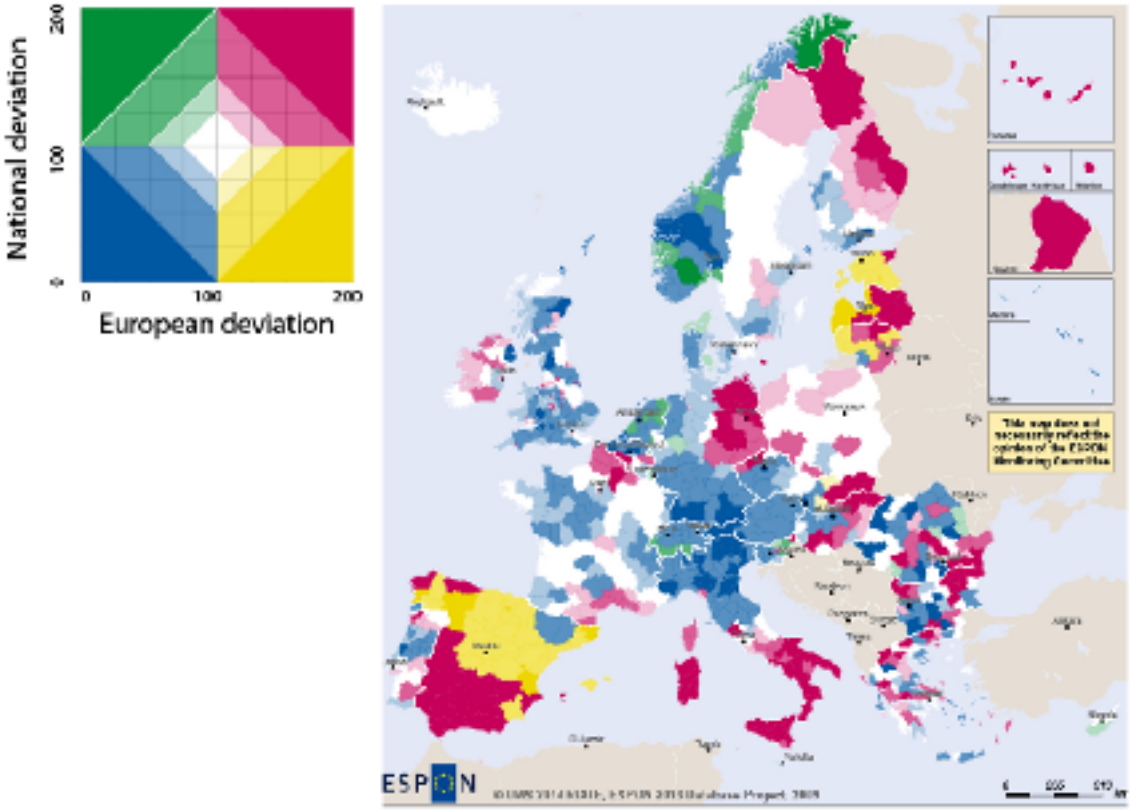
- Figure 6.13 shows in yellow the territorial units whose unemployement rate is above average at European level and under at National level:

Figure 6.13. Dual synthesis map: yellow units



- Figure 6.14 shows the final typology on the complete synthesis map:

Figure 6.14. Dual synthesis map: final typology



Chapter 7. HyperAtlas Tools

This section details the available tools and main functinalities of the HyperAtlas software.

7.1. Available map tabs

First of all, let's review the available maps tabs and their main focuses:

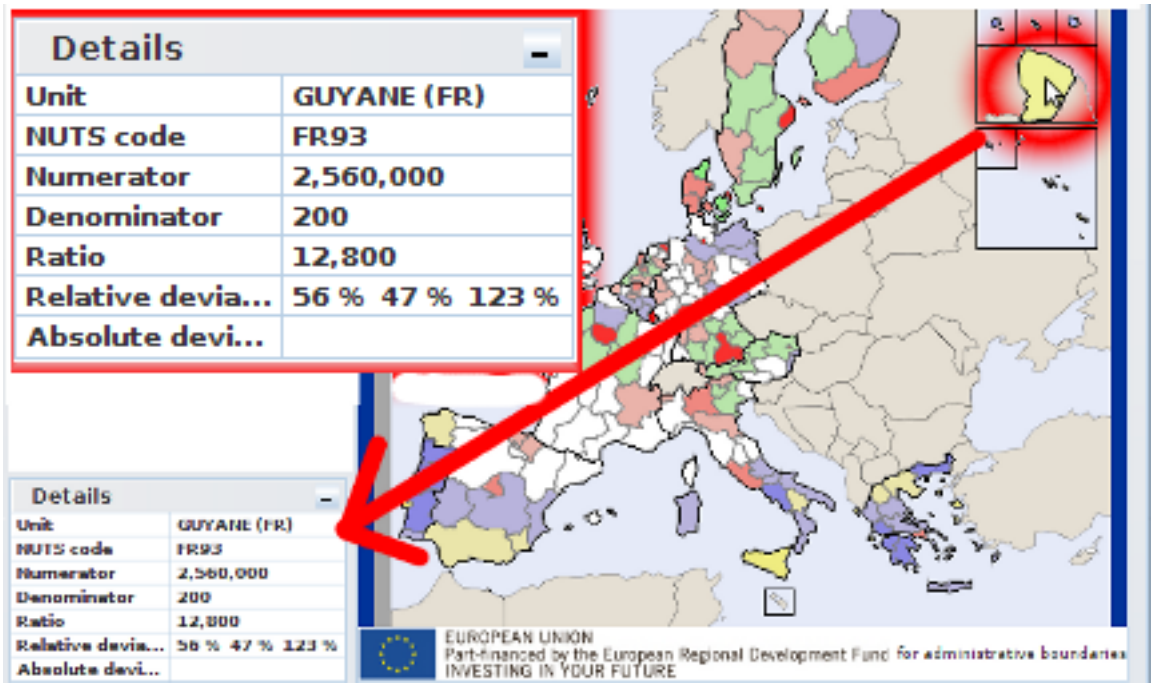
Area and zoning	This map shows the chosen study area and elementary zoning.
Numerator	This map shows the chosen study area and elementary zoning.
Denominator	This map shows the value of the chosen denominator indicator for each unit of the elementary zoning.
Ratio	This map shows the distribution of the ratio (numerator/denominator) over the units of the elementary zoning.
General deviation	This map proposes the relative perspective of the distribution of the ratio over the units of the elementary zoning: each absolute measure is put in relation with a reference value. The reference value is common for the whole area. The index value is 100 when an elementary unit has exactly the same value than the reference value or area. It is 200 when the elementary unit measure is twice the measure of the reference area, it is 50 when this is half the measure of the reference area.
Territorial deviation	This map proposes the relative perspective of the distribution of the ratio over the units of the elementary zoning: each absolute measure is put in relation with the value of its upper unit in the reference zoning. The index value is 100 when an elementary unit has exactly the same value than its reference unit. It is 200 when the elementary unit measure is twice the measure of the reference unit, it is 50 when it is half the measure of the reference unit.
Spatial deviation	This map proposes the relative perspective of the distribution of the ratio over the units of the elementary zoning: each absolute measure is put in relation with the value of its neighborhood, as defined by the local reference. The index value is 100 when an elementary unit has exactly the same value than its neighborhood. It is 200 when the elementary unit measure is twice the measure of its neighborhood, it is 50 when it is half the measure of its neighborhood.
Synthesis	This map proposes a synthesis of the different perspectives by considering the three different contexts. The synthesis is based on a deviation threshold, either by upper values or by lower value. These parameters depend on the meaning of the ration and they must be chosen by the user. Then, a typology of the regions which check the condition for at least one context is performed.

7.2. Appearances and functions of the mouse cursor

At any moment, the position of the mouse cursor on the map provides information about the elementary unit that it points. The content of the table depends on the current map, Figure 7.1 shows the case of the synthesis map where are displayed:

- the name of the territorial unit
- the code of this unit
- numerator stock value
- denominator stock value
- ratio (numerator/denominator) value
- relative deviations values based on the selected references
- the absolute deviation values are only available in expert mode

Figure 7.1. Details box for the synthesis map



This screenshot shows the "Details" box on the left bottom corner of the application. The user's mouse is over the Guyane. Associated computed values to this unit are displayed in the box.

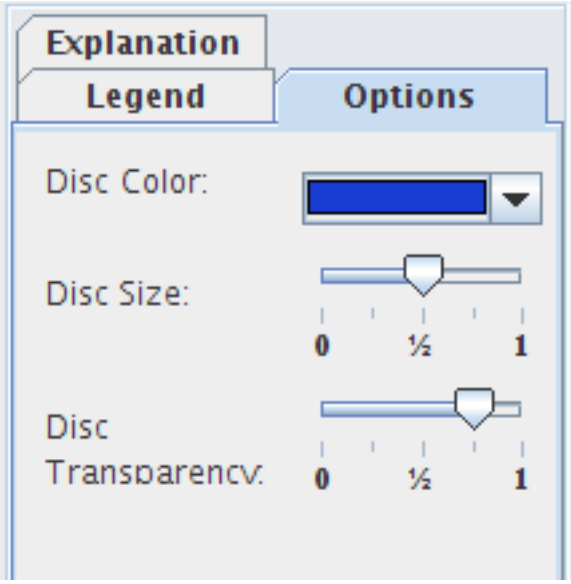
Except for the synthesis map, a left click anywhere on the map changes the function of the cursor to “Pan”, as long as this option is on (see Section 5.3).

On the synthesis map, the "hand" mouse pointer shows that the histogram function is on. A right click on a region opens its histogram synthesis view (see synthesis as an histogram [34]).

7.3. Legends, options and explanation tabs

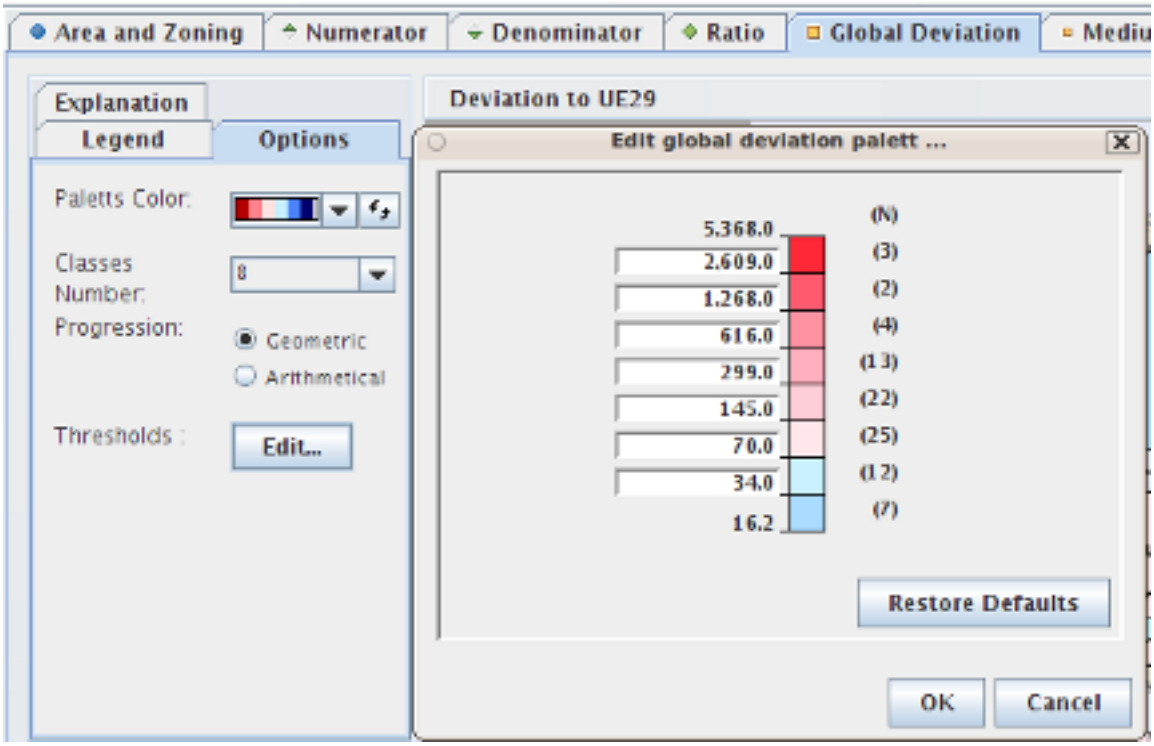
Each map is associated to a set of three tabs that provide tools to control and to understand the cartography. The choices are valid for the current map. Figure 7.2 displays each the "Options" tabs for an indicator map (that shows proportional circles) while Figure 7.3 displays the available options on a deviation map (palett of colors). The user may also set the thresholds for each class. The "Legend" tab displays the bounds of the classes (left), the number of items for each of them (right), and the associated color. The "Explanation" tab displays some general notes about the goal of the current map.

Figure 7.2. Options for proportional circles



The "Options" tab of the numerator or denominator maps aims at setting the representation of the indicator values by selecting a color, the size and transparency of proportional circles.

Figure 7.3. Options for deviation maps



The "Options" tab of the deviation maps aims at setting the representation of the deviation by selecting:

- **the palett of colors**, that can be reversed
- **the number of classes**, between two and ten classes
- **the progression**:
  - **arithmetic** for classes with an equal amplitude, better choice when the distribution is symmetric around 100.
  - **geometric** for classes with an increasing amplitude
- **the thresholds**, that can be edited for each class

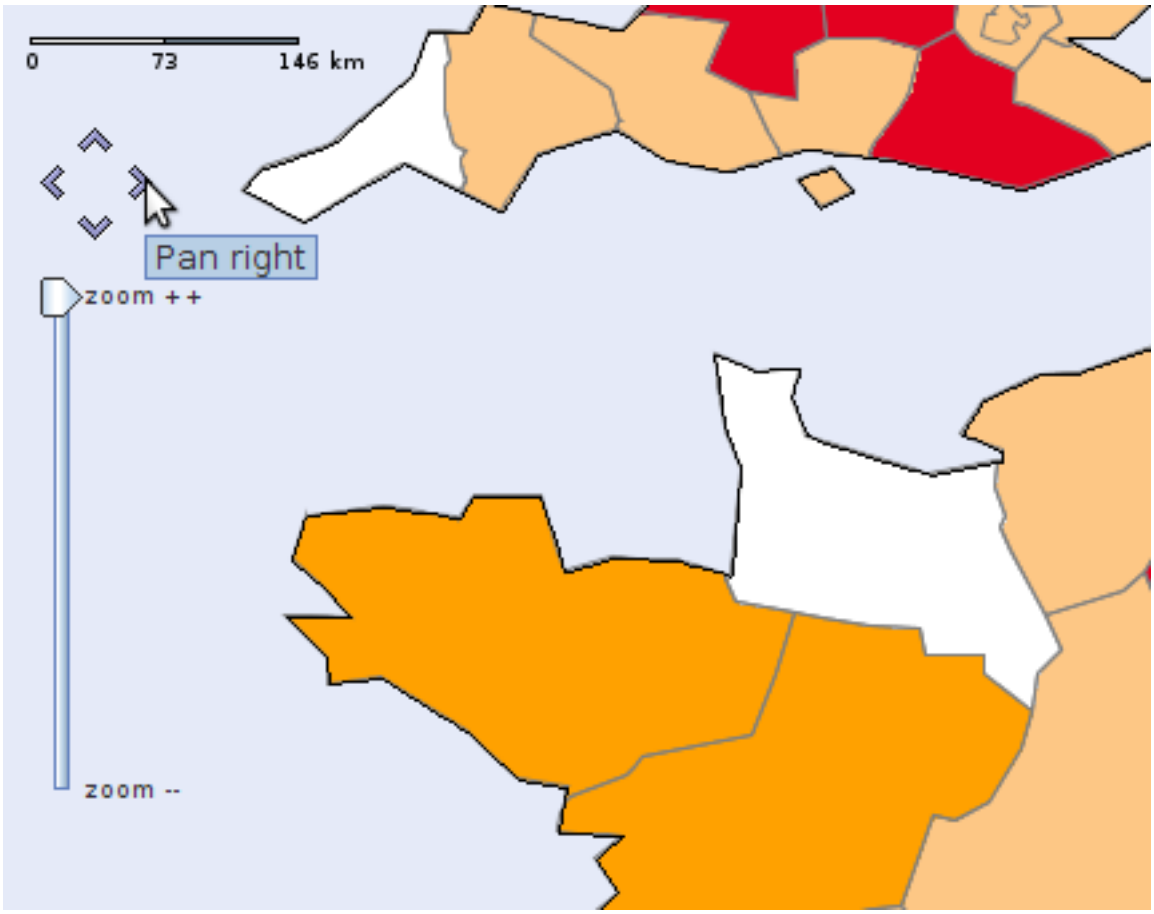
7.4. Zoom

It is possible to zoom in/out a map, either on clicking the "View - Zoom" menu items, by using the cursor on the left side of the map or by moving the mouse scroller over the map.

Please note:

- the available zoom levels depend on the selected elementary zoning parameter: reduced zoom factor for high levels, maximized at lowest level;
- any zoom factor update or pan move are applied to every map;
- the scale of the map is consequently updated.

Figure 7.4. Spatial zoom slider



This screenshot shows the scale, the pan buttons and the zoom slider.

7.5. Report

The user can save his current whole collection of maps with the associated rough data and deviations by selecting the "File - Build Report" menu item from the menu bar.

By selecting this menu item, the user is invited to select a directory on his/her disk where the report will be generated as a set of HTML page (`index.html` and eight PNG image files (one image per map: `map0.png`, `map1.png`, to `map7.png`).

For example, if the user selected his `/home/toto/my_hyperatlas_report/` directory as target directory, he/she may open the saved report from a web browser by selecting the `/home/toto/my_hyperatlas_report/index.html` file.

The generated report may be divided in the three-fold:

- the introduction shows the space area, chosen indicators and contexts
- the list of maps for these parameters as images files
- the table of generated results for these parameters

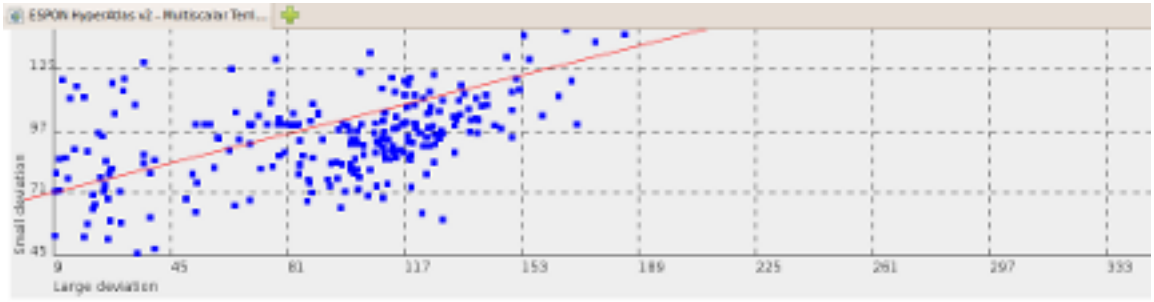
In expert mode, the generated report also includes expert tabs as images:

- the three equi-repartition maps
- the tab showing the Lorenz curve and the main statistical indexes

- the boxplots chart
- the spatial autocorrelation chart

Figure 7.5 shows an extract of the generated table of results, including all values for all units as they can be seen on the "Details" box (see Figure 7.1)

Figure 7.5. Screenshot of a generated report



Workspace data

Territorial unit		Numerator	Denominator	Ratio	Large deviation	Medium deviation	Small deviation
Code	Name	GDP_eur_2005	pop_t_2005	GDP_eur_2005/pop_t_2005	European Union 27	NUTS 0	Contiguity
AT11	BURGENLAND (A)	5573285.0	278.8	19,990	88.91	67.35	108.73
AT12	NIEDERÖSTERREICH	3.7739832E7	1575.5	23,950	106.54	80.71	129.73
AT13	WIEN	6.6179016E7	1638.9	40,380	179.60	136.05	168.57
AT21	KÄRNTEN	1.3957078E7	560.1	24,910	110.83	83.96	96.72
AT22	STEIERMARK	3.0523754E7	1199.8	25,440	113.15	85.72	119.45

This screenshot shows an extract of the generated report `index.html` file that has been opened by in web browser. This image shows the last map (synthesis) and the start of the table that includes all results.

Chapter 8. HyperAtlas Expert Mode

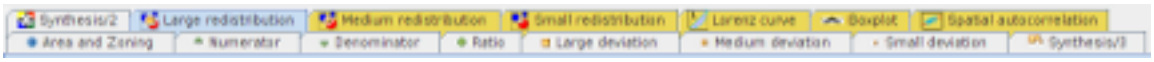
This chapter describes a set of tools that have been integrated since the version 2 of HyperAtlas. As this set of cartographic and statistic tools are mainly designed for more advanced users, they are not available by default at the startup of the application. In order to keep the application easy to use for *not so advanced users*, this set of tools must be enabled on clicking the **Enable expert mode** menu item of the "Tools" menu, shown on Figure 5.6.

Graphically speaking, enabling the expert mode adds six new tabs to the eight available tabs in default standard mode:

- three tabs for equi-repartition maps (respectively for large/medium/small contexts of reference), they are described in Section 8.2 section.
- a tab showing a Lorenz curve and a table computing relevant statistical indexes. This feature is described in Section 8.1 section.
- a tab showing a chart of boxplots, described in Section 8.3 section.
- a tab showing a spatial autocorrelation chart, described in Section 8.4 section.

In order to distinguish the default mode tabs and the expert mode tabs, expert tools tabs titles backgrounds are displayed with a golden colour. Enabling the expert mode automatically enables and displays the "equi-repartition" map for the large context, the list of tabs is shown on Figure 8.1.

Figure 8.1. Expert mode enabled



Default mode set of tabs is added six new tabs when enabling the expert mode.

Depending on the operating system, the Java Runtime Environment version (1.5 or upper is required) and the user's browser, the display may differ. For example, under the Mac OS X.5 operating system with a JRE 1.5, the tabs are embedded in a scrollable list.

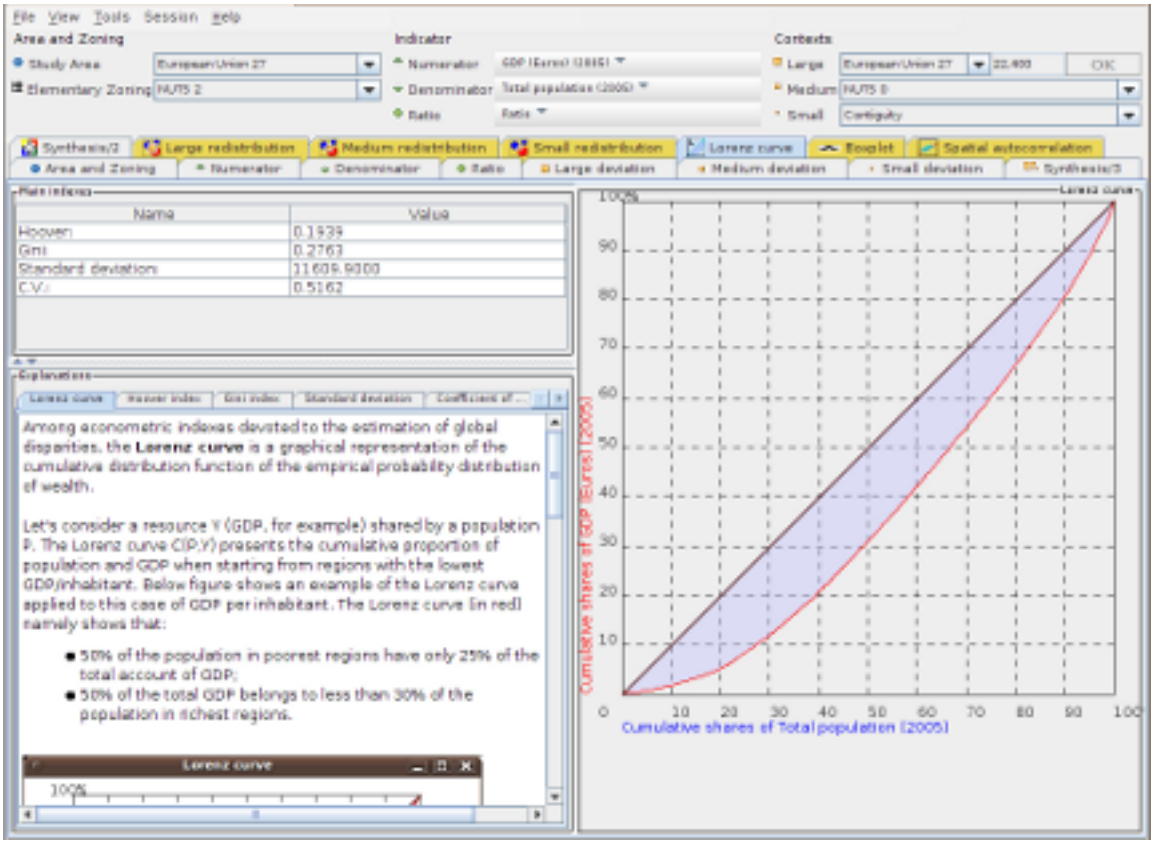
8.1. Lorenz curve and statistical indexes

The map of large deviation provided by HyperAtlas is a general measure of disparities for a given variable Z which is the ratio between two stocks X and Y. This estimation of general disparities can be further analysed using various econometric indexes that have been added in HyperAtlas v2 expert mode:

- the Lorenz curve typically presents the cumulative proportion of population and resource when starting from regions with lowest resource per inhabitant.
- the Gini Coefficient is a summary of the Lorenz curve measuring the global amount of disparities: it is equal to the area located between the Lorenz Curve and the diagonal (perfect-equality)..
- the Hoover index, also called Disparity index, is another summary of the Lorenz Curve, as it is equal to the maximum distance between Lorenz Curve and diagonale.
- The Coefficient of Variation is simply equal to the ratio between standard deviation and average of the considered ratio Z.

A complete description of the Lorenz curve and of the main statistical indexes is directly available in a dedicated "Explanation" panel of the statistical box, close to the curve panel, as shown on Figure 8.2.

Figure 8.2. Lorenz curve, statistical indexes and explanations


File View Tools Session Help
Area and Zoning
Indicator
Contexts
Synthesis(2)
Large redistribution
Medium redistribution
Small redistribution
Lorenz curve
Boxplot
Spatial autocorrelation
Area and Zoning
Numerator
Denominator
Ratio
Large deviation
Medium deviation
Small deviation
Synthesis(3)
Name
Value
Hoover:
0.1939
Gini:
0.2763
Standard deviation:
11609.9000
C.V.:
0.5162
Among econometric indexes devoted to the estimation of global disparities, the Lorenz curve is a graphical representation of the cumulative distribution function of the empirical probability distribution of wealth.
Let's consider a resource Y (GDP, for example) shared by a population P. The Lorenz curve C(P,Y) presents the cumulative proportion of population and GDP when starting from regions with the lowest GDP/inhabitant. Below figure shows an example of the Lorenz curve applied to this case of GDP per inhabitant. The Lorenz curve (in red) namely shows that:
50% of the population in poorest regions have only 25% of the total account of GDP;
50% of the total GDP belongs to less than 30% of the population in richest regions.
Lorenz curve
100%
Cumulative shares of GDP (Euros) (2005)
Cumulative shares of Total population (2005)
0
10
20
30
40
50
60
70
80
90
100

This tab shows the Lorenz curve, a table of main statistical indexes, and an "Explanations" titled panel providing some information for each feature.

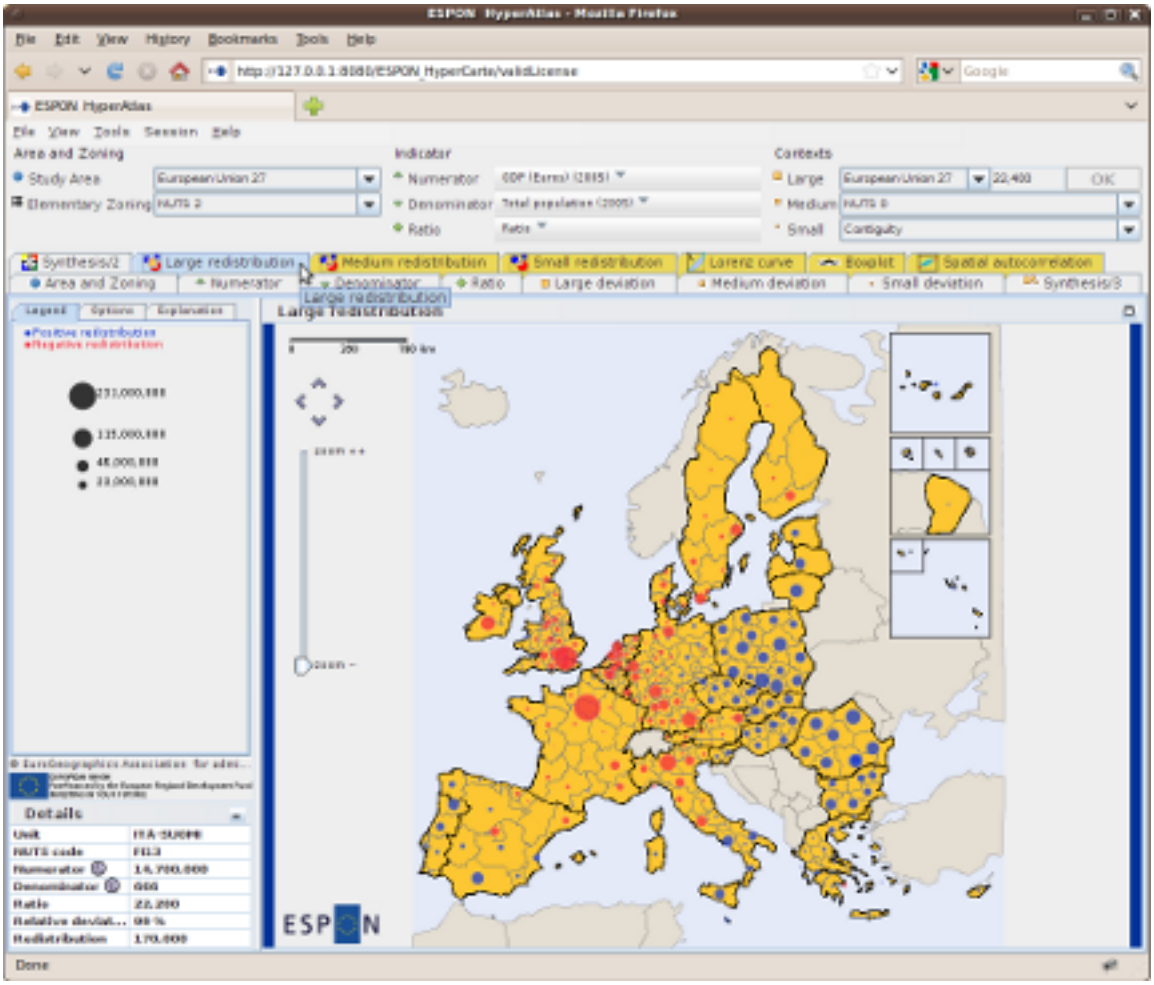
8.2. Equi-repartition map

The equi-repartition maps indicate which process of redistribution should be realized in absolute terms in order to achieve convergence, at European, national or local levels.

The equirepartition map is a bi-color discs map showing an absolute deviation. It examines how much amount of the numerator should be moved in order to reach equi-repartition, for each territorial unit, taking into account as a reference the selected deviation context value.

Thus, three equi-repartition maps are available in expert mode for respectively the large, medium and local deviations tabs. As an example, Figure 8.3 shows the equi-repartition map (also called "Redistribution" map) for the large context.

Figure 8.3. Equi-repartition map



Bicolor discs map.

8.3. Boxplots chart

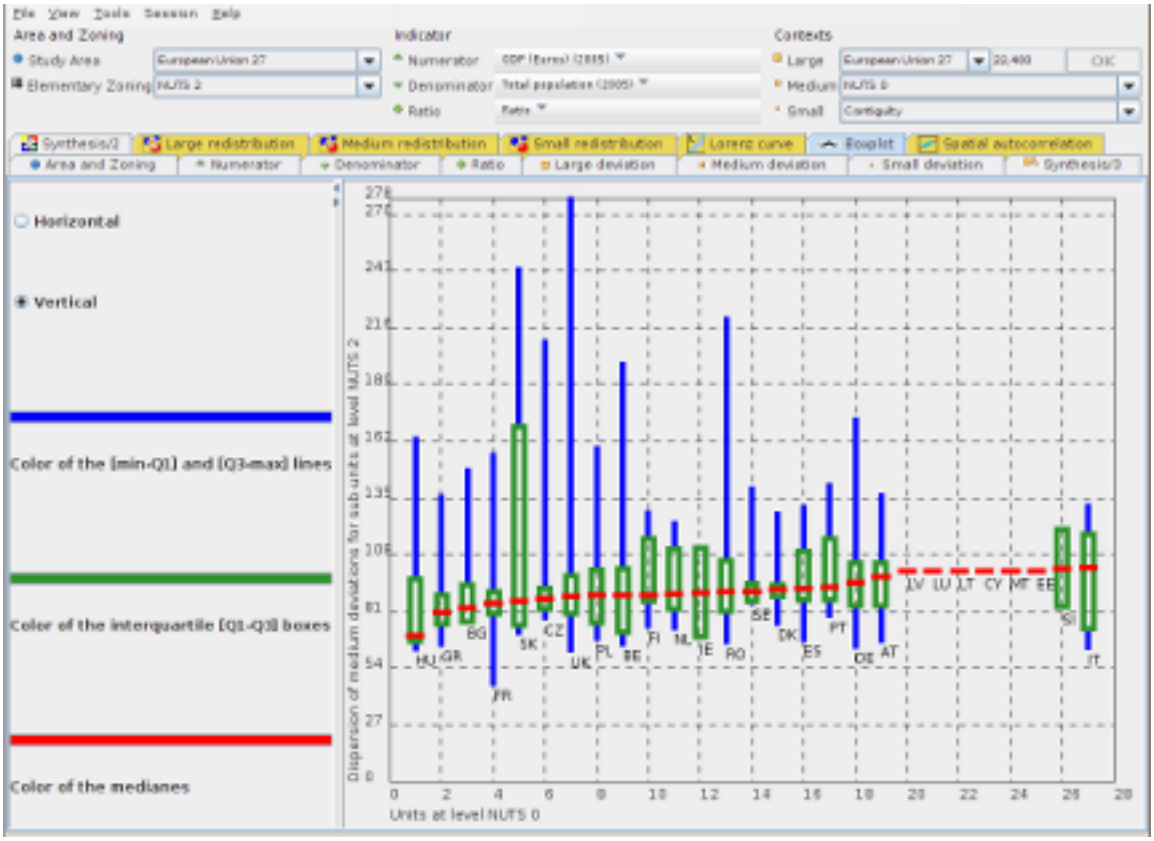
For each unit in the chosen medium context (NUTS 0 for example in Figure 8.4), this chart shows the dispersion of the medium deviation for the territorial units at sub-levels (NUTS 2 level in Figure 8.4).

A boxplot typically provides the following information:

- two lines show the values between:
  - the minimum and first quarter Q1
  - the third quarter and maximum Q3
- a box shows the interquartile Q1-Q3
- a line shows the mediane value
-

The HyperAtlas boxplots chart may be displayed horizontally or vertically, the colors may be adapated to the user's conveniance.

Figure 8.4. Boxplots chart


Horizontal
Vertical
Color of the [min-Q1] and [Q3-max] lines
Color of the interquartile [Q1-Q3] boxes
Color of the medianes
Units at level NUTS 0

Available in expert mode.

8.4. Spatial autocorrelation chart

The spatial autocorrelation chart is only available when the expert mode is enabled.

For each territorial unit of the study area, this chart crosses the values of the spatial deviation on absissa axis with the values of the territorial deviation on ordinates axis.

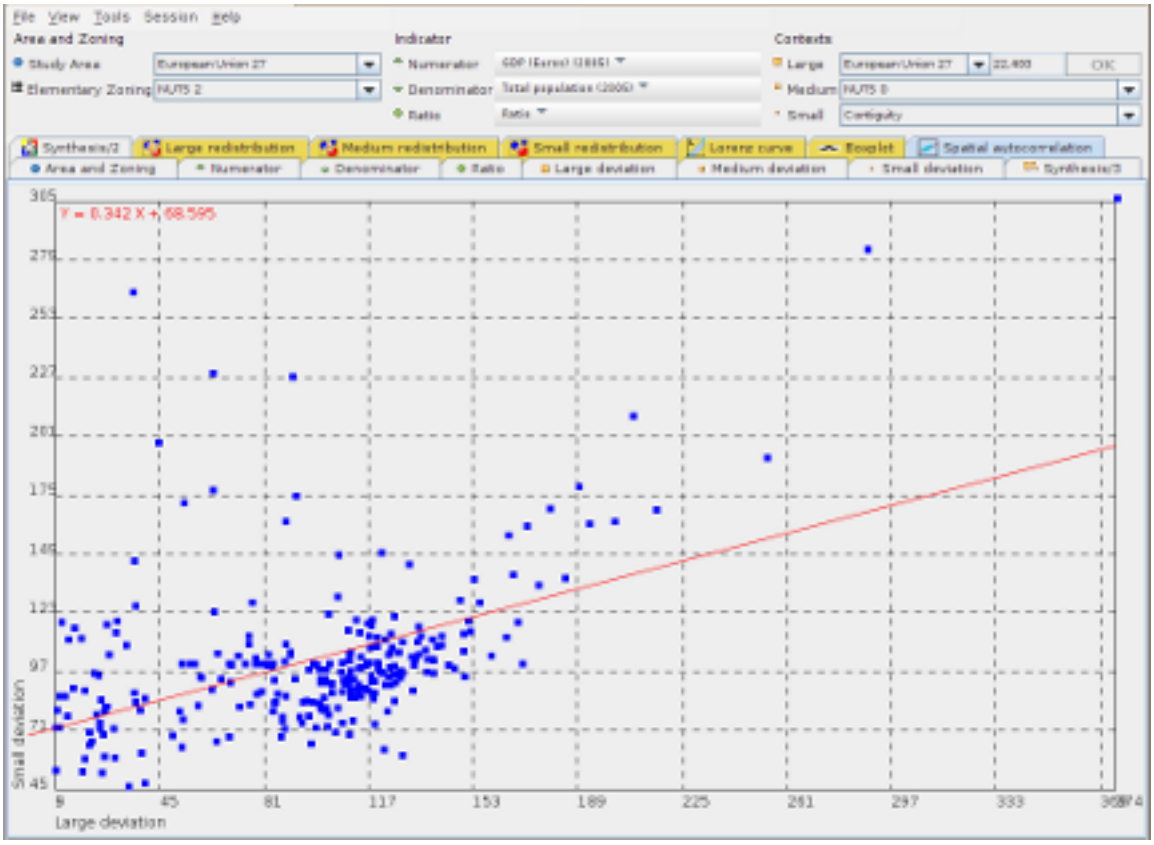
This chart is very interesting for expert users as it reveals spatial dependancy, e.g. spatial organization of a phenomena.

More empirically, the chart can also be used to examine the situation of outliers and exceptional units out of the cloud of points.

The compute of this chart is based on a Moran's coefficient of spatial autocorrelation variant. The regression line is drawn in red on the chart, its equation, computed by the least squares method, is displayed on the left corner of the frame, as shown on Figure 8.5.

Each unit is drawn as a blue square, its name is displayed in a tooltip when the mouse comes over the square.

Figure 8.5. Spatial autocorrelation chart



Available in expert mode.

Appendix A. When things go wrong...

This section deals with the problems that may happen when using HyperAtlas.

Below Known bugs section proposes a non-exhaustive list of problems that can be worked around when using the HyperAtlas software.

Like most of Java applets, the HyperAtlas software displays logs messages to the "Java Console". This window is not enabled by default on most of standard browsers. If HyperAtlas does not behave as expected and described in this user's manual, first enable this Java Console. Note that the display of the Java console depends on your operating system and on your Web browser. Please consult the following links (last visit: 20101228):

- Windows users: How do I enable and view the Java Console? [http://www.java.com/en/download/help/javaconsole.xml];
- Mac OS X users: Java Frequently Asked Questions [http://developer.apple.com/java/faq/]
- RedHat and Suse Linux users: How do I enable and view the Java Console for Linux? [http://www.java.com/en/download/help/5000021200.xml].

In order to improve the application, for any comment question or suggestion, please contact by email the members of the HyperCarte Research Group at the following address: `<hypercarte@imag.fr>`.

As far as possible, please also report encountered bugs and complete your message with eventual output logs, information about your environment, the version of the application, etc.

Thanks in advance!

A.1. Known bugs

A.1.1. HyperAtlas is frozen

HyperAtlas sometimes seems frozen as nothing happens when changing a parameter. Most of the time, your java console will display the log message shown on Figure A.1.

A simple action allows to workaround this bug: simply resize your window!

Figure A.1. Java console: stroke shape error

Displayed log message when the maps of HyperAtlas seem frozen.

A.1.2. Deviations maps update

The deviations maps may sometimes appear "all in grey"... Just click the deviation context combo box in the parameters panel in order that HyperAtlas takes into account the changes of references.

A.1.3. Multiple boxes appear

After several analysis with several datasets, multiple messages boxes may appear. As a Java Applet is loaded in memory for a whole browser session, multiple instances may cause this problem.

The simplest thing to workaround this disturbing behaviour is to close your browser, then restart it.

This bug should be fixed in a next iteration.

Appendix B. Acronyms

Find here an alphabetical arrangement of most often used acronyms in this document:

- **DBMS**: DataBase Management System.
- **ESPON**: European Observation Network for Territorial Development and Cohesion [1].
- **GDP**: Gross Domestic Product.
- **HTML**: HyperText Markup Language.
- **JRE**: Java Runtime Environment.
- **MTA**: Multiscalar Territorial Analysis.
- **NUTS**: Nomenclature of territorial units for statistics (see also a definition of NUTS in the glossary).
- **XML**: Extensible Markup Language.

Appendix C. Glossary

Some Definitions

Deviation	The relative deviation of a given region (i) to a context is defined by equation Figure C.1. The relative deviation depends on the chosen context (general, medium or local), it shows the gap between the value of the unit and the average value of the context. The deviation is expressed in a percentage of the context average value (100 is the pivot).

Figure C.1. Mathematical formula of the relative deviation

$$RD_i^{Context} = 100 \cdot \frac{\frac{Num_i}{Den_i}}{\frac{\sum_j C_{i,j} \cdot Num_j}{\sum_j C_{i,j} \cdot Den_j}}$$

This figure shows a general formula to compute the relative deviation `RD` of a territorial unit *i* for the chosen context `Context`. Needed variables are:

- Num_x is the value of the indicator chosen as the Numerator parameter for the territorial unit `x`.
- Den_x is the value of the indicator chosen as the Denominator parameter for the territorial unit `x`.
- C_i^j is a boolean whose value depends on the chosen context:
  - **General context**: C_i^j=1 if the current territorial unit `j` is included in the reference area, C_i^j=0 in other cases. For example, if the reference area is EU-15, C_i^j takes the value 1 for regions of EU-15 and the value 0 for regions of the candidate countries.
  - **Territorial context**: C_i^j shows if two regions `i` and `j` belong or not to the same area. In the case when the medium context considers the state level, C_i^j takes the value 1 for regions belonging to the same state and the value 0 for regions belonging to different states.
  - **Spatial context**: C_i^j shows the potential level of local interactions between two regions `i` and `j`. The local interaction may be for example defined by a boolean variable which takes the value 1 for contiguous regions and the value 0 for non-contiguous regions. Currently, we have decided that a region is not neighbour to itself (Locii=0) but it is possible to choose the solution where a region is part of its own neighbourhood (Locii=1). Many alternative solutions are possible according to the definition of the neighbourhood criterion (kilometres time, cost, length of common boundary, ...) and to the measure of the potential level of interaction. This parameter may not be a boolean but a continuous probabilistic function between 0 and 1.

See Also General deviation, Spatial deviation, Territorial deviation.

Elementary unit

The set of elementary units compose (cover) the whole area, and constitute the elementary zoning.
See Also Elementary zoning.

Elementary zoning

Smallest division of the studied area. Each unit of this zoning is called elementary unit.
See Also Elementary unit.

General deviation
: Deviation when the context of reference is the general area. The reference can be an available study area or a any value chosen by the user.
See Also Deviation.

Spatial deviation
: Deviation when the context of an unit is defined by the set of units that belongs to its neighbourhood (for instance adjacent units), contiguous regions by default.
See Also Deviation.

Territorial deviation
: Deviation when the context is defined by a territorial unit that belongs to a chosen higher zoning level which contains the considered unit.
See Also Deviation.

Launcher
: Name of the Java Executable Archive file of an HyperAtlas standalone application version distribution. Most of the time, this file is named `HyperAtlas.jar`.

NUTS (Nomenclature of territorial units for statistics)
: Established by EUROSTAT for over 30 years, NUTS is a territorial subdivision system used in Europe "in order to provide a single uniform breakdown of territorial units for the production of regional statistics in the European Union" [1]. The NUTS zoning nomenclature for Europe organizes all units in a hierarchy of levels:

  - `NUTS 0` groups administrative units at country level : France, Germany, Spain, Italy, etc.
  - `NUTS 1` groups administrative units at great region level : ILE DE FRANCE, BASSIN PARISIEN, EST, CENTRE-EST, etc.
  - `NUTS 2` groups administrative units at region level (Région in France - Länder in Germany - Comunidades autonomas in Spain, regioni in Italy) : ILE DE FRANCE, RHONE-ALPES, PACA, etc.
  - `NUTS 3` groups administrative units at departement level (Département in France - Kreise in Germany - Provincias in Spain, Provincie in Italy): Essone, Isère, Savoie, etc.
  - `NUTS 4` and `NUTS 5` are now deprecated levels that are respectively replaced by `LAU 1` and `LAU 2`. LAU acronym stands for Local Administrative Unit.

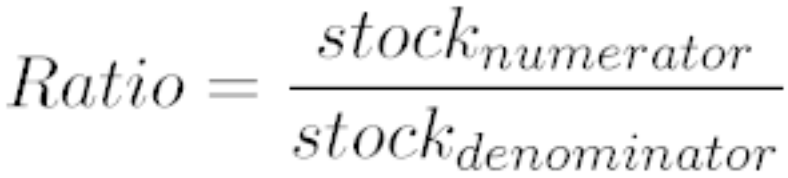
Report
: HTML document that lists the set of parameters used for analysis (study area, zoning, context for deviation, indicators for numerator and denominator) and the maps which are generated by the application.

Stock
: Social-economic count, like number of deaths on 1999 year, number of births on 1999 year, total population in thousand on 1999 year. Stocks should be valued on each elementary unit. There are also called **indicators**.

Study Area
: Territorial space on which we will base the analysis. It can be Europe, Cameroun, or France by example. Only one study area can be loaded in the same time by the application.

Ratio
: A ratio between two stocks which are defined and available on the same set of territorial units.

Figure C.2. Ratio



$$Ratio = \frac{stock_{numerator}}{stock_{denominator}}$$

Workspace	Context of analysis and selected options in the application when working on a study area: zoom level, map mode, etc. It can be exported to an XML file.

Appendix D. References

Links

[1] ESPON Coordination Unit. *ESPON*. [on line]. http://www.espon.eu/ (last visit: 1.st december 2009).

[2] ESRI. *ESRI Shapefile Technical Description - An ESRI White Paper - July 1998*. [on line]. https://www.esri.com/library/whitepapers/pdfs/shapefile.pdf (last visit: 28 th of July 2015).

[3] HyperCarte Research Group. *Site Web du Groupe de Recherche HyperCarte - Accueil*. [on line]. http://hypercarte.imag.fr (last visit: 28 th of July 2015).

[4] Pitney Bowes MapInfo. *Appendix J: MapInfo Data Interchange Format*. [on line]. http://resource.mapinfo.com/static/files/document/1074660800077/interchange_file.pdf (last visit: 28 th of July 2015).

[5] Politiques de la Terre. *Présentation*. [on line]. http://politiquesdelaterre.fr/?page_id=2 (last visit: 28 th of July 2015).

[6] QGIS. *QGIS - A Free and Open Source Geographic Information System*. [on line]. http://www.qgis.org/en/site/ (last visit: 28 th of July 2015).

[7] Wikipedia. *ESRI Shapefile*. [on line]. https://en.wikipedia.org/wiki/Shapefile (last visit: 28 th of July 2015).

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Colophon

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[1] [on line] *DocBook.org* [http://www.docbook.org] (last visit: July 2011)
[2] [on line] *Apache Ant - Welcome.* Version 1.7.1 [http://ant.apache.org] (last visit: July 2011)
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[4] [on line] *Xalan-Java Version 2.7.1* [http://xml.apache.org/xalan-j/] (last visit: 18 november 2009). Version 2.7.1.
[5] [on line] *Apache FOP* [http://xmlgraphics.apache.org/fop/download.html] (last visit: July 2011). Version 0.94.